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The modern journal of classic aeroplanes and the history of flying

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THE 1959 WORLD CONGRESS OF FLIGHT



ISSUE No 17

NEW BOOK:

Northrop Delta - AB Aerotransport

Rob J. M. Mulder

At the beginning of the 1930s, night mail services started to become more and more important for European airlines. Navigation and safety equipment had improved drastically and aircraft became much more economical to fly. The introduction of the fast Lockheed Orion by Swissair in April 1932 led to a true revolution within air transport. Everyone wanted aircraft that flew faster than their existing obsolete Fokker or Junkers aircraft did.

In Sweden, AB Aerotransport's Managing Director, Carl Florman, became interested in faster airliners as well. In 1933 he saw, during a visit to Norway, a Northrop Gamma and was interested in a similar aircraft for his airline. Offers were requested and through Northrop's representative, Norwegian aviator Bernt Balchen, AB Aerotransport ordered a passenger Delta 1C and a mail aircraft, the Delta 1E.

The operation of both aircraft was marked by problems and challenges for the pilots. It took them some time to master the aircraft. The Delta 1E never entered service, as it crashed on a trial mail flight. In 1937 AB Aerotransport sold the Delta 1C to Spanish airline Líneas Aéreas Postales Españolas — LAPE. It was in civil and military service until well after World War Two.

Following intensive research, the author describes in detail the history of the Northrop Alpha, Beta, Gamma and Delta (civil and military), as well as the operation of the two aircraft in service with AB Aerotransport, illustrated with many photographs, tables, drawings and colour artwork by Juanita Franzén, Mats Averkvist and Nils Mathisrud.

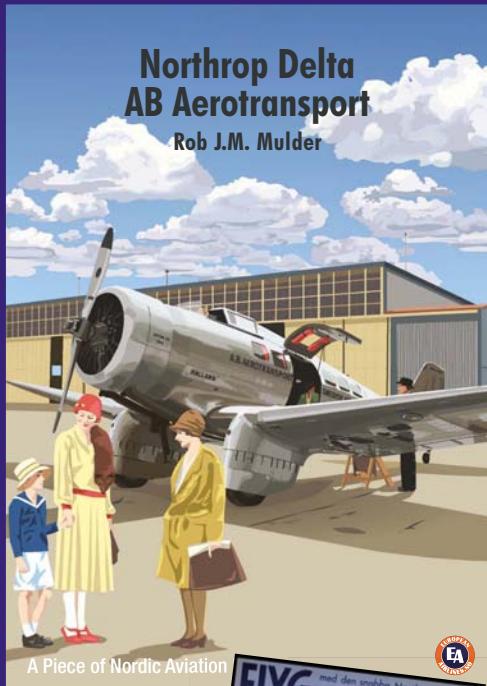
About the book: 21.5cm x 30.2cm, 176 pages, hard covers, 187 b/w photos, many tables, colour section with profiles. ISBN 978-82-93450-00-9

Prices:

Europe/rest of world: € 29 + p.p.

Norway/Sweden: Kr. 250 + p.p.

ISBN 978-82-93450-00-9



Order your copy now at WWW.EUROPEANAIRLINES.NO/EUROSHOP
European Airlines Rob Mulder, Norway

Published quarterly by:
The Aviation Historian
PO Box 962
Horsham RH12 9PP
United Kingdom

Subscribe at:
www.theaviationhistorian.com

ISSUE NUMBER 17
(published October 15, 2016)



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Published quarterly by *The Aviation Historian*,
PO Box 962, Horsham RH12 9PP, United Kingdom

© *The Aviation Historian* 2016
ISSN 2051-1930 (print)
ISSN 2051-7602 (digital)

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The modern journal of classic aeroplanes and the history of flying

Editor's Letter

A VERY WARM welcome to Issue No 17, which, I'm delighted to say, marks the beginning of our fifth year of operations. As usual for TAH, it's an issue which covers a lot of historic ground, from flying with the Royal Naval Air Service in the early days of the Great War to Stefan Karwowski's dazzling displays in a scarlet Hunter on the 1980s UK airshow scene. Stefan was a force of nature, the Ayrton Senna of airshow flying, with an intuitive gift for revealing the poetry that resides in the knife-edge between complete control and chaos. Like Senna, "Stef" ultimately found out how sharp that knife-edge can be. Paul Fiddian's fascinating profile of this perennially restless perfectionist starts on page 104.

Rewinding to a rather more sedate era, much has been written about the golden age of civil air transport, in which elegant flying-boats overnighted at exotic locations on their way to the far corners of Empire. Rarely considered, however, is the sheer volume of paperwork required to make it a reality. When the Empire Air Mail Service was established in 1937, the joint Imperial Airways/Qantas Empire Airways fleet was put to work on a 12,000-mile route with stops in numerous third-party nations — what happened when a part had to be replaced or an airframe came up for a renewal of its Certificate of Airworthiness while away from its home base? In an article which epitomises the TAH ethos of fresh perspectives, Phil Vabre details the solutions devised by a determined group of pioneers who changed commercial air operations forever.

Don't forget to let us know if there's anything you'd like to see in TAH; veteran subscribers will know by now that we love to uncover the unusual and the unexpected — there's a very good chance that what tickles your fancy, tickles ours too!

FRONT COVER You looking at me? The second prototype Convair XB-58 Hustler at the World Congress of Flight in 1959. TAH ARCHIVE

BACK COVER The mail is brought ashore from an Empire Air Mail Scheme Short Empire Flying Boat in 1938. QANTAS HERITAGE COLLECTION

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With the variable-geometry General Dynamics F-111 due to enter RAF service in the late 1960s, the question vexing the top brass was what to call it, as Chris Gibson relates

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With nearly three-quarters of the 25 built lost in accidents, Sweden's ASJA Sk 10 military training biplane was the subject of a major controversy, as Jan Forsgren reveals

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AIR CORRESPONDENCE



Letters to the Editor

Hong Kong hazards

SIR — In the article *Spies in Cold War Skies* in TAH16, although the high-level work with a Hong Kong-based Spitfire got honourable mention, nothing was said of the somewhat basic and uncomfortable work done by solitary Vickers Valettes along the New Territories frontier with China. What little I know about it was derived from talking with some of the crew members involved during my time in South-east Asia in the early 1950s, but it seems to have been a fairly hairy process.

As far as I recall the aircraft was flown at low level close to the frontier, at a fairly low speed, with the passenger door removed and a camera positioned or held in the open space. However, it was soon found that the combined effects of slipstream plus exhaust and heat from the No 1 engine made for poor photographic results and so the sorties had to be flown on one motor, the No 1 being shut down and prop feathered. Needless to say, in the turbulence and heat of a Hong Kong summer, performance was inevitably somewhat marginal! Whether or not the results justified the risks, I don't know; no aircraft were lost but occasional shots were allegedly fired from the other side — probably more as a deterrent rather than with any serious intent.

Can anyone out there provide any further enlightenment regarding this strange practice, i.e. type(s) of camera used, exact flight procedures etc?

In the same article, the Kai Tak picture on pages 56–57 gives a fair idea of the hazardous nature of Hong Kong's original airfield, looking to the north-west. The main runway 31/13, although not visible in the picture, was just off shot to the left and "aimed" pretty much at the saddle just to the left of Lion Rock; thus all approaches had to be flown creeping over the

foothills, with the ridge close at hand and above immediately to one's left, in a continuous descending turn until finally lining up with the runway within the last half mile or so. I should also mention that the presumably zoom-free camera of the day gives an impression of the high ground being fairly distant, whereas in real life it looked (and indeed was!) really quite close. Take-off on 31 was of course normally a no-no!

Harry Liddell Fairford, Gloucestershire

[If anyone can supply chapter-and-verse on the Valettes' Chinese border flights, we would welcome it — Ed]

Müller light

SIR — Looking at my copy of *Bomber Units of the Luftwaffe 1933–1945 Vol 1*, which I designed, it would appear that Peter Müller (*A Model Prisoner*, TAH15) didn't last long with III./KG 30.

The unit formed in October—November 1940 at Schiphol in Holland with Ju 88A-5s (redesignated III./KG 4).

Müller [seen at LEFT with the Fw 200 model he made as a PoW — Ed] spent most of January 1941 on leave, but participated in a few sporadic attacks on Britain at the end of that month. He transferred to Gerbini in Sicily on February 22, 1941. I assume from this entry —

"1941-02-28, 7./KG 30, Ju 88A-5,
0886021, 4D+HR, Bei Bengasi" — he was

shot down six days later

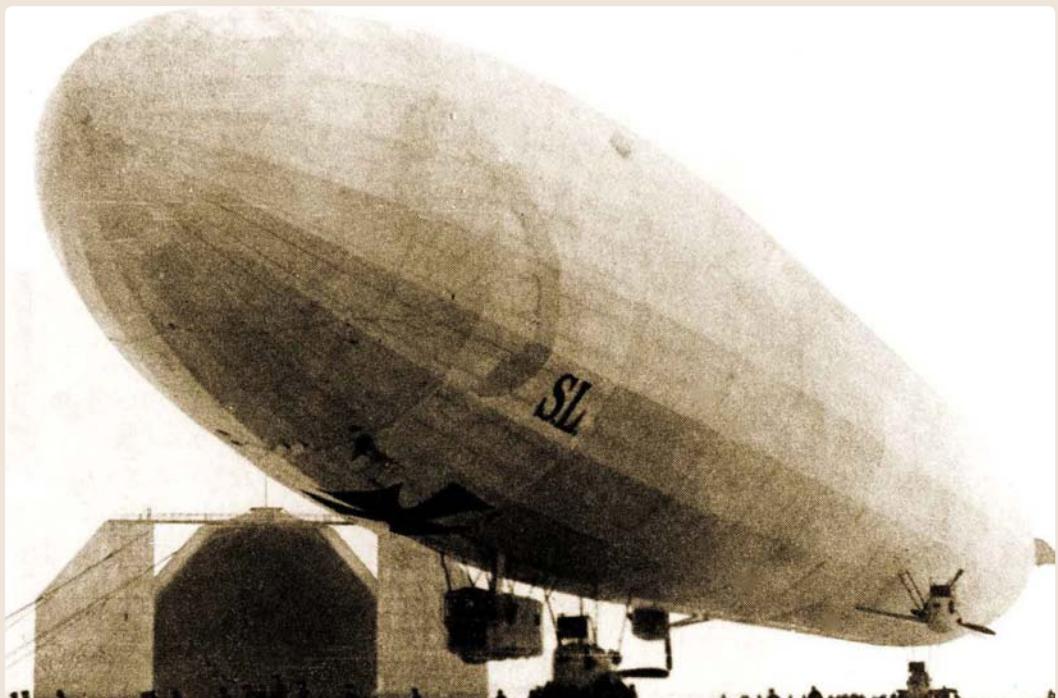
Mark Nelson Mittagong, NSW, Australia



A Vulcan captain remembers

SIR — In his article *A Close Shave at Wellington* (TAH5), Jonathan Pote gets a detail wrong when he says that only Vulcan XH498 flew to Wellington on its own for the airport's opening ceremony on October 25, 1959. In fact all three antipodean-tour Vulcans were there, the others being XH499 and XH502. We had done a

Will the real SL 11 please stand up?



VIA RAY RIMELL

A CLARIFICATION has come to us from Ray Rimell, author of the superb feature on Lt William Leefe Robinson VC — The Reluctant Overnight Hero — published in TAH16. As he rightly says, “that is not [Schütte-Lanz airship] SL 11 on pages 24–25 but SL 2; a quite different ship of an earlier type”. The scant handwritten information on the back of the photograph merely states “SL II”, which I misread as “SL 11” when it actually meant “SL 2” but written in Roman rather than Arabic form. Ray has kindly provided a poor-quality but rare photograph of the real SL 11 at its base at Spich in order to set the record straight. Apologies all round! — Ed.

formation rehearsal on October 23, but the planned opening day (October 24) had very strong winds, rain and low clouds (400ft base), so the event was postponed for 24hr.

The next day was fine, but still windy and gusty. All three aircraft took off from Ohakea and did a couple of flyovers in vic formation; I was leading in XH499 and there is a photograph of us departing. Vulcan XH498 then peeled off, performed a couple of rollers, and then the near-disastrous accident happened. The first we knew of it was hearing the tower ask if he wanted to fly by for them to assess the damage. This was declined, as the periscope would show the damage, and Tony Smailes said he was returning to Ohakea. I said to XH502 that we had better get back there first.

We saw '498 arrive. Wing Commander Bower, my nav plotter, was with me and shot up into the tower when we landed and instructed them

to go out to sea and bale out, but Tony said he would land — which he did very skilfully, blowing the canopy and streaming the 'chute. I remember it well.

Darrell Hamley via e-mail

Night Hawk — the final word?

Doing some research at The National Archives, I have been working through TNA AIR1/337/15/226/2246 RN Air Dept Sections Weekly Reports — and from “Y” Section for week ending 10.03.1916 there is the following entry which sheds light on the style of name for the Supermarine anti-Zeppelin quadruplanes (*Pemberton Billing and the Four-Winged Farrago*, TAH8; and letters in *Air Correspondence*, TAH11 and TAH14):

“Draft specification has been drawn up for Supermarine for two Quadruplane pusher aeroplanes (Night Hawk). This order was to

replace some of the P.B. scouts of which 20 had been ordered."

Well, there it is: the initial quadruplane was the Night Hawk!

Colin Owers Watson, ACT, Australia

And then on to Qantas

SIR — The *Singapore Express* article in *TAH13* reminded me of the accompanying photograph [RIGHT]. I was delighted years ago to discover that the very young gunner in this Australian Brisfit crew (the pilot is Major Syd Addison) had survived the war — he had actually retrained as a scout pilot — to become managing director of Qantas. You ran a portrait of him, Wilmot Hudson Fysh, at the head of the piece.

Smiling in the World War One photograph, the young Lt Fysh looks like he was an engaging lad (Maj Addison, by contrast, looks a tough nut!) — and even in *TAH*'s illustration he has a hint of smile on his face. However, from what I have read elsewhere Fysh was reputedly one of the hard men of the commercial air transport world.

Philip Whiteman Teddington, Middlesex



Javelin scramble . . .

SIR — I found an enigma in *TAH15* concerning the article *Brothers at Arms*.

On page 19 is a paragraph headed *Attrition and Desertion*. Now, are you sure the patrol went out on February 6, 1966, and that Javelin XH890/'M' forced-landed on its return? The reason I ask is that when I read the article it struck a chord, and I went to have a look through my old friend Flt

Lt Dave Morgan's flying logbook, of which I have a copy. Dave was flying Javelin XH890/'M', with Sqn Ldr Hutchinson as navigator, on June 1 and 2, 1966, not February, and his logbook records that he forced-landed on the 2nd. All Dave put in his logbook was "Leg fell off. Cat 5". I have a similar picture to the one in the article, but before the panels went missing and the belly tank got mutilated.

Looking further back through Dave's logbook I note that he was flying on February 6, 1966, but it was an aircraft exchange when he flew to N'dola in XH894/'E' and returned safely.

So, has the author/RAF AHB got it wrong and why is it so far out of date?

In the same issue, on page 120, Roy Braybrook

Time to think about next year . . .

AS 2017 BEGINS to loom on the horizon, dates need to be planned for the new year — so here is a selection of aviation calendars which could aid in that task while gracing your wall. The two larger ones (20in x 14in) are the famous GHOSTS calendars created by the doyen of air-to-air photography, Philip Makanna; they feature various World War Two and World War One subjects respectively. Order them for \$14.99 + p&p apiece from www.ghosts.com or

GHOSTS, 665 Arkansas Street, San Francisco, Ca 94107, USA. The smaller one (8½in x 11¾in) is the Cross & Cockade International calendar, featuring paintings of World War One subjects by 12 different artists. It is available for £10 + p&p from www.cross-andcockade.com or by post from Cross & Cockade International, Hamilton House, Church Street, Wadenhoe, Peterborough PE8 5ST. Proceeds support upkeep of the British Air Services Memorial at St Omer.



says in his review of the Hawker projects that the OR.329 and OR.339 were won by Fairey, but he had not seen any details about those projects. If he goes to *Air International* No 61, Jan/Feb 1996, he can read all about the Fairey F.155T enigma in Tony Buttler's article about all the projects put forward to meet these ORs/Specs.

A lovely and fascinating issue!

Bill Harrison Derby

[I've had a look into the Javelin "enigma", and it can be easily solved. You're quite right, XH890 was involved in a landing accident at N'dola on June 2, 1966, not February 6, as we stated. What I suspect has happened is that the author, Guy Ellis, who is South African, has looked at the date of the accident (officially noted as "2.6.66") and applied the American date method, ie MM/DD/YY, which gives us February 6, 1966, rather than the British method (DD/MM/YY) which will of course give us the correct date, June 2. Ta-dah! Had the incident occurred on the 13th or later of any month, I might have twigged! Top marks to you for some eagle-eyed spotting — Ed.]

... Vic Falls jolly ...

SIR — Regarding the article *Brothers at Arms* in TAH15, on the Javelin operation in Zambia, in 1966 I was an engine fitter on the RAF Britannia and was detached to Nairobi for six weeks servicing the Britannias on the fuel lift to Lusaka.

During a few days off, a couple of us managed to get to see Victoria Falls. After flying in one of our Britannias to Lusaka we waited around for a day until we were offered a lift in a Zambian Air Force (ZAF) Dakota to Livingstone. After a quick look at the Falls, we returned to Lusaka by ZAF DHC Caribou — a real bone-shaker; thence back to Nairobi on one of our Britannias. At that time a number of RAF personnel were seconded to the Zambian Air Force and were very helpful.

Brian Gardner via e-mail

... and aerial elephant-herding

SIR — Having enjoyed *Brothers at Arms* in TAH15, I thought you might find this interesting.

When I was writing an article some years back about the Gloster Javelin FAW.9, I corresponded with the late Peter Thorn, who was with the detachment which went to N'dola.

He recounted to me the following anecdote: "A week or so after our arrival a request came in asking if we could help to persuade a herd of elephants to be encouraged to turn about as they were getting very close to civilisation (the outskirts of N'dola). We obliged; head-on at low level with reheat engaged, over several days. I really felt sorry for them. It must have been terrifying; but it did the trick."

An unusual mission!

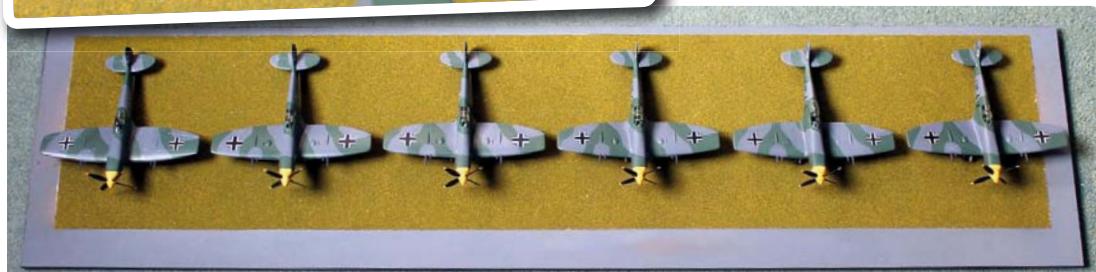
Doug Gordon Langourla, Brittany, France



MESSERSCHPITTS ...IN MINIATURE

We love it when TAH provides inspiration.

Prompted by an article in our very first issue, subscriber Malcolm Mortimer from Shawbury has made 1/72nd-scale models of the Supermarine Spitfires that were specially painted for the RAF's first post-World War Two air display at Farnborough in 1950. At least eight clipped-wing Spitfire XVIs, some with bubble canopies, were painted to represent Messerschmitt Bf 109s, and six took part in the display's re-enactment of the 1944 raid on Amiens prison. The Spitfires all carried the "UT" codes of No 17 Sqn RAF.





QANTAS HERITAGE COLLECTION

PAPER TRAILS IN THE SKY

AIRWORTHINESS CONTROL & THE AUSTRALIAN EMPIRE FLYING BOATS, 1937-38

When Britain and Australia agreed in 1937 to collaborate on the ambitious Empire Air Mail Scheme, the single biggest challenge facing the enterprise was how to maintain the vital airworthiness records of a combined fleet of complex aircraft dispersed across the globe. **PHIL VABRE** explores the birth of a pioneering administrative system still in use today

TODAY the trans-national operation and maintenance of commercial aircraft is relatively commonplace; 80 years ago this was not the case. At that time, by international agreement, aviation was regulated very much along nationalistic lines. The introduction of the British Empire Air Mail Scheme (EAMS), and particularly the insistence of Australia on participation in its own right, raised problems of trans-national airworthiness control during 1937-38 that had never been encountered or dealt with before in any systematic way. The resolution of these problems of trans-national inter-operability presaged modern regulatory arrangements that



are still used in today's international commercial aviation industry, in which both "dry leasing" of foreign-registered aircraft and "offshore maintenance" are relatively common.¹ [Endnote references, indicated by numbers at appropriate points in the text, are provided at the end of the article — Ed.]

FIRST PRINCIPLES

The Convention Relating to the Regulation of Aerial Navigation concluded in Paris in 1919 and had, for the first time, codified in international law the principles of international air operations. A chief objective of the states that drew up the Convention, including Britain and Australia, was the protection of their own individual national

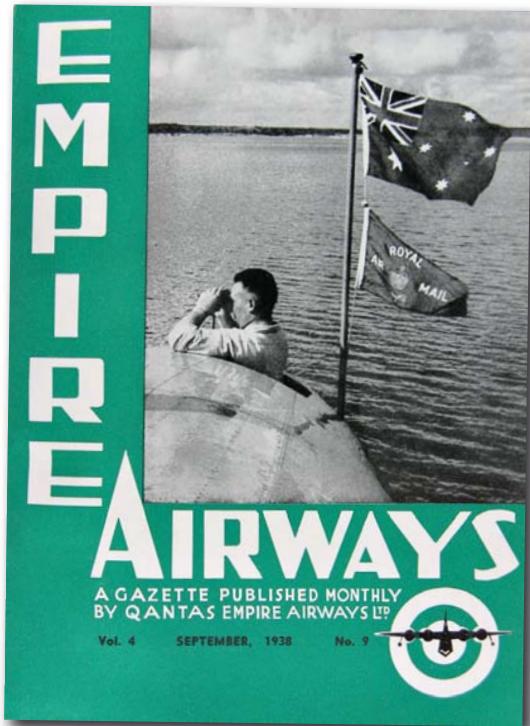
interests. One of the agreed principles, with far-reaching consequences, was that aircraft must be registered in the state of the nationality of the owners, and consequently possess the nationality of the state of registry. Another principle was that aircraft engaged on international air operations must have a Certificate of Airworthiness (CoA), valid for a maximum of 12 months, issued or rendered valid by the state of registry. Similarly, members of an aircraft's crew and ground engineers must also possess licences issued or rendered valid by the state of registry.²

In practice, what this meant was that normally only those personnel licenced by the state of registry of an aircraft could operate it, maintain it or certify it as safe for flight. Similarly, only the state of registry could issue or renew an aircraft's CoA. One problem for CoA renewals potentially thrown up by these requirements was foreseen by the International Commission for Air Navigation (ICAN), the body formed under the League of Nations out of the 1919 Paris Convention to oversee international standards for air transport.

In July 1935 ICAN promulgated regulations covering the issue and renewal of CoAs. In the event that an aircraft was in another country when its CoA expired, the regulations permitted the state of registry to "apply to the authorities [of another state], requesting them to proceed, by delegation, with the necessary technical investigations for the renewal in question".³ The state of registry still had to renew the certificate.

In 1937 the Australian Government finally reached an agreement to participate in the British proposal to establish the EAMS, encompassing all the trunk air routes throughout the British Empire, to be operated by the British monopoly airline, Imperial Airways Ltd (IAL).⁴ One of the key elements of the British proposal, accepted with reluctance by the Australian Government, was the creation of a unified fleet of large, modern flying-boats to operate the EAMS.⁵ However, as a condition of participation in the scheme, Australia insisted on continued operational control over what it saw as its rightful part of the Australia—UK air route, i.e. between Sydney and Singapore. Furthermore, the Australian Government also insisted on Australian ownership of six of the resulting Short S.23 Empire Flying Boats (often known as "C-Class") in order to provide an independent national air transport asset in times of crisis, and to assure Australian control over its part of the route.⁶

The agreement finally reached meant that the Australian airline Qantas Empire Airways (QEA) would continue to operate the Sydney—Singapore section, but the Empire flying-boats themselves, including the six owned by QEA, would be interchanged between QEA and IAL along the



VIA AUTHOR

ABOVE The September 1938 issue of Empire Airways, QEA's monthly gazette featuring news and articles on the airline's activities. **OPPOSITE PAGE** In homage to the popular hand-coloured postcards of the era, the author has coloured this 1938 shot of IAL Short S.23 G-AEUD Cordelia at Bima in the Dutch East Indies.

full length of the route between Australia and England. The Australian Government had also agreed that all overhauls and heavy maintenance for the Australian flying-boats would be undertaken in the UK, at least initially, although the Australian Government reserved the right to establish overhaul facilities in Australia. There is little evidence that the negotiators thought through the detail of what these arrangements might mean in practice, and, consequently, they created some unanticipated problems.

INITIAL HEADACHES

The transition to the EAMS clearly threw up some issues in relation to the Convention and its regulations. First, British and Australian crews would be flying each other's aircraft. While there was well-established recognition of each other's pilot's licences by the British and Australian authorities, the international situation was more complicated. Under the EAMS there would be, for example, instances of British crews flying Australian-registered flying-boats into the territories of third countries.

The airworthiness field was different again. Up to 1935, when a ban on the importing of American



ABOVE The Short Bros factory at Rochester, Kent, photographed in November 1937 by Australian Civil Aviation Branch (CAB) aeronautical engineer R.S. "Russell" Robinson. Having its final touches applied in the centre of the photo is Qantas Empire Flying Boat VH-ABB Coolangatta, with an early production Sunderland MK I to the left.

commercial aircraft was lifted, British aircraft dominated the Australian scene.⁷ Therefore, wrote Mr B.A.J. Scoles, the Australian Department of Transport's Chief Airworthiness Engineer in the late 1970s, "it was natural Australia should take its lead from the British airworthiness system which adhered to the ICAN regulations. Thus the Australian airworthiness 'bible' was Air Ministry publication A.P.1208, *The Airworthiness Handbook for Civil Aircraft*, and the organisation and administration of ground-engineer licensing standards followed closely the British system".⁸

The bonds of Empire notwithstanding, at the outset of the EAMS there was no mutual recognition between the British and Australian authorities of each other's ground-engineer licences or CoAs. That is to say, a British engineer could not sign off work done on an Australian aircraft, nor could an Australian-registered aircraft operate on a British CoA.⁹ Indeed, the British and Australian airworthiness authorities had clashed in the early 1930s over structural problems with the de Havilland D.H.80 Puss Moth, and again a few years later over the de Havilland D.H.86. [See David Crotty's article The Singapore Express in TAH13 — Ed.] In both instances the Civil Aviation Branch (CAB) of the Department of Defence, the Australian regulatory authority, for a time grounded all Australian examples of these types owing to concerns about airworthiness following a series of accidents in Australia. Although there were

clearly problems with both types' designs, the British authorities resented this action by "upstart colonials" in questioning their airworthiness approvals.¹⁰ A degree of scepticism where British airworthiness standards were concerned lingered and undoubtedly coloured the Australian view during the negotiations on the Empire flying-boat airworthiness-control problems. At one point, the CAB's capable Superintendent of Aircraft, Gordon Berg, wrote, "I must say . . . that the seat provided for the wireless operator on the [first Empire 'boat to visit Australia] fell far below our ideas of airworthiness, both in itself and in its attachments, and certainly such a seat would not have been tolerated on an Australian aircraft".¹¹

The matter was further complicated by the fact that, although working from a common basis, the British and Australian authorities had evolved two distinctly different administrative systems. In Australia, the CAB performed all regulatory airworthiness functions. In Britain two separate organisations were involved. The Air Registration Board (ARB) was formed in 1936 as the body responsible for the airworthiness of British aircraft.¹² In turn, the ARB answered to the Air Ministry, the government department originally formed to manage the affairs of the RAF. In 1919, a civil aviation section had been created within the Air Ministry, which thus also regulated the affairs of British civil aviation, and was the body that formally issued and renewed CoAs on recommendation from the ARB.¹³



ABOVE LEFT The CAB's Superintendent of Aircraft Gordon Berg (right) and Inspector of Aircraft Les Ellis in the late 1930s. **ABOVE RIGHT** The CAB's UK representative, Senior Inspector of Aircraft T.E. "Tommy" Johnson (right), confers with Charles Kingsford Smith while standing on a strut of the latter's Fokker trimotor Southern Cross.

In late 1937 the CAB despatched Head Office Senior Inspector of Aircraft T.E. "Tommy" Johnson to England to study IAL's Empire flying-boat maintenance procedures and negotiate with the Air Ministry and the ARB. Johnson was faced with four main questions. What maintenance procedures should QEA adopt? How would these integrate with IAL's procedures given the interchange of 'boats and that much of the major work would be completed in the UK? How would work necessarily done by QEA in Australia be recognised by the British authorities? And, given that overhauls were to be undertaken in the UK, what procedure should be adopted for renewing the Australian CoAs for the Australian 'boats?

FINDING SOLUTIONS

Johnson began by studying IAL's maintenance systems and quickly discovered that IAL had adopted some innovative practices. Imperial had created a unique overhaul regime for the Empire 'boats, the principle of which has since become the standard for large commercial aircraft. Up to that time the practice when renewing an aircraft's CoA annually had been to take the aircraft out of service for a complete inspection and overhaul of the airframe, engines and equipment. With the Empire 'boats introducing a new level of size and complexity, such an inspection and overhaul would mean that each flying-boat would be out of service for two months or more each year — clearly an uneconomical proposition.

The solution adopted by IAL was a scheme of "rolling" CoA inspections and overhauls, which IAL termed "continuous CoA". The normal flying schedules called for each 'boat to remain at Hythe in England for a week or so between trips. During these layovers, the opportunity would be taken to perform part of the total required CoA inspection. During the next layover, a different part of the aircraft would be inspected. A similar routine applied to the aircraft's equipment. During each layover, a certain amount of equipment would be removed, overhauled and replaced, or swapped for freshly overhauled units.

This complex process was kept on track in IAL's Hythe maintenance office using large charts to record when each component of the CoA renewal for each flying-boat was due and completed. In this way, every 12 months the complete CoA inspection and overhaul routine should have been completed for each 'boat. All that remained was a two-week visit to the hangar to complete any outstanding work and a final inspection.

Another novel feature of the maintenance practices adopted for the Empire flying-boats was that the complexity of the aircraft itself and the "continuous CoA" process meant that the traditional scheme of manual logbook entries to certify work done was no longer possible. Instead, IAL adopted a system of loose-leaf forms, which would be pasted into the logbooks when completed. Today, this is a system still widely used for smaller aircraft.¹⁴



ABOVE A surprisingly small crowd watches the first Short Empire Flying Boat to be beached at Rose Bay as G-AEUE Cameronian is towed up the newly-completed slipway in the eastern suburb of Sydney on January 25, 1939. With its opening, Rose Bay became the only slipway suitable for beaching Empire 'boats east of Singapore.

Overhaul procedures for the Bristol Pegasus Xc engines used by the Empire 'boats also differed markedly from conventional practice.¹⁵ When a Pegasus was sent to IAL subsidiary Imperial Airways (Repair Work) Ltd at Croydon for its first overhaul, it would be stripped down into its component parts. Each major component would be given an individual IAL serial number and, provided it remained in satisfactory condition after overhaul, would be put into a pool of such components. When the time came to rebuild the engine, parts would be drawn at random from the pool. Thus, each engine did not retain its identity in the conventional sense and the engine serial number was largely meaningless except to identify where particular components were installed at any given time.

Imperial claimed that this method saved overhaul costs and also the amount of spares that needed to be held in stock. The immense job of keeping track of where each component was and how many hours it had run was done at the Croydon Airport office of Imperial Airways (Repair Work), where individual record sheets for each component were maintained. No fewer than 35 record sheets for each built-up engine were required to provide a complete history. Individual engine logbooks served only to record the IAL component numbers of the parts installed at any particular time and the hours run on that particular build since last overhaul.

Finally, Johnson discovered another important difference between the British and Australian

systems. In Australia licensed ground engineers were permitted to sign off their own work. This would be checked by the company's inspection staff and countersigned, and the resulting paperwork would normally be accepted by the CAB as sufficient for CoA renewal. The CAB would then endorse the CoA with a new validity date and return it to the operator. Under the British system, not only did the engineer and company inspector sign for work done, an ARB surveyor also physically checked the work too. To this end, the ARB employed two surveyors in Hythe on Empire 'boat renewals alone. When satisfied that all required work had been completed properly, the ARB surveyor issued a "Short Term CoA" to IAL. The original certificate was sent to the Air Ministry along with details of any amendments and a recommendation for renewal. The Air Ministry then endorsed the original CoA with a new validity date and returned it to IAL. Exceptions to this convoluted procedure existed in that ARB surveyors in Egypt and Malaya (Singapore) were authorised to modify and renew the original CoAs for British aircraft.

ALPHABET SOUP

Even before negotiations between the British and Australian authorities could begin, in December 1937 QEA applied to register the first two of its six Empire 'boats in Australia.¹⁶ These two aircraft had been delivered to IAL in the UK, on behalf of QEA, already marked with their Australian registrations (which had previously



ABOVE Qantas Empire Airways' VH-ABF Cooee is hauled ashore at the Singapore land and marine airport at Kallang in the early days of the war. Although the slipway at Rose Bay was completed in January 1939, there was still no other location to beach an Empire 'boat along the 4,692 miles (7,550km) between Singapore and Sydney.

been allotted), but operating on British CoAs — something theoretically not possible under the 1919 Convention.¹⁷ Because the Australian service was not due to begin for at least another six months, QEA and IAL had reached an agreement in which IAL would operate the aircraft until such time as they were actually required on the Australia service.

The CAB's reaction was to refuse Australian registration, as the required inspections to transfer the aircraft to the Australian register could not be completed until the aircraft were physically within its jurisdiction, i.e. in Australia. In any case, with airworthiness-control arrangements between the UK and Australia nowhere near finalised, it would be inappropriate for the flying-boats to be on the Australian register when the CAB had no way to supervise their airworthiness. As a result, the Australian flying-boats were all given British registrations, although they continued to wear their factory-applied Australian registration marks for some time.¹⁸

As a result, there followed a protracted period of negotiation, with Johnson in Britain talking directly with IAL, the ARB and the Air Ministry, and relaying the results back and forth to Australia by telegram. In general, the Australians took the position that, while they were happy to delegate authority to the ARB and Air Ministry to supervise maintenance done in England on their behalf, they were reluctant to adopt unique practices for the QEA Empire 'boats, either in Australia or in Britain. Nevertheless, differences



ABOVE When the hangar at Rose Bay was completed in late 1939, maintenance could at last be performed indoors out of the weather. Here the starboard inner Pegasus of one of the six original Qantas-owned 'boats is changed at Rose Bay. Note the work platform slung from fold-out sections of the wing leading edge; "health and safety" was rather different in those days!



LEFT As part of the EAMS negotiations, Australia held out for the right to perform overhauls locally if required. With financial backing from the government, Qantas eventually built an engine workshop in the Sydney suburb of Mascot, in which this Qantas fitter overhauls Bristol Pegasus cylinders circa 1940–41.

BELOW The first two Empire 'boat' deliveries for QEA – VH-ABA Carpentaria and VH-ABB Coolangatta – had their Australian registrations applied at the factory and were probably never repainted with their British registrations. However, the third delivery, G-AEUG Coogee, seen here at moorings on the Shatt al-Arab at Basra during this period, is clearly marked with its British registration.

in the two airworthiness control systems forced compromises in some areas.

Johnson quickly established that the British authorities would not accept QEA engineers' signatures as certification for work completed in Australia and required a counter-signature from a CAB inspector. The CAB was initially reluctant to go down this path, Gordon Berg writing to his boss, Controller of Operations Wg Cdr A.H. "Harry" Cobby: "I feel we should obtain further information before agreeing to provide covering certification from one of our own inspectors for repairs or replacements on 'boats' registered in Australia. To do so would involve a change in our general policy towards the responsibilities of the ground engineers, and we should be thoroughly satisfied that such a change is in the best interests of all concerned before we adopt a different policy for Qantas than for other operators".¹⁹ Cobby agreed. However, in due course, the CAB was compelled to accept the British position and increased its inspectional role at QEA's Rose Bay base to provide counter-signatures for work completed on the Empire 'boats'.

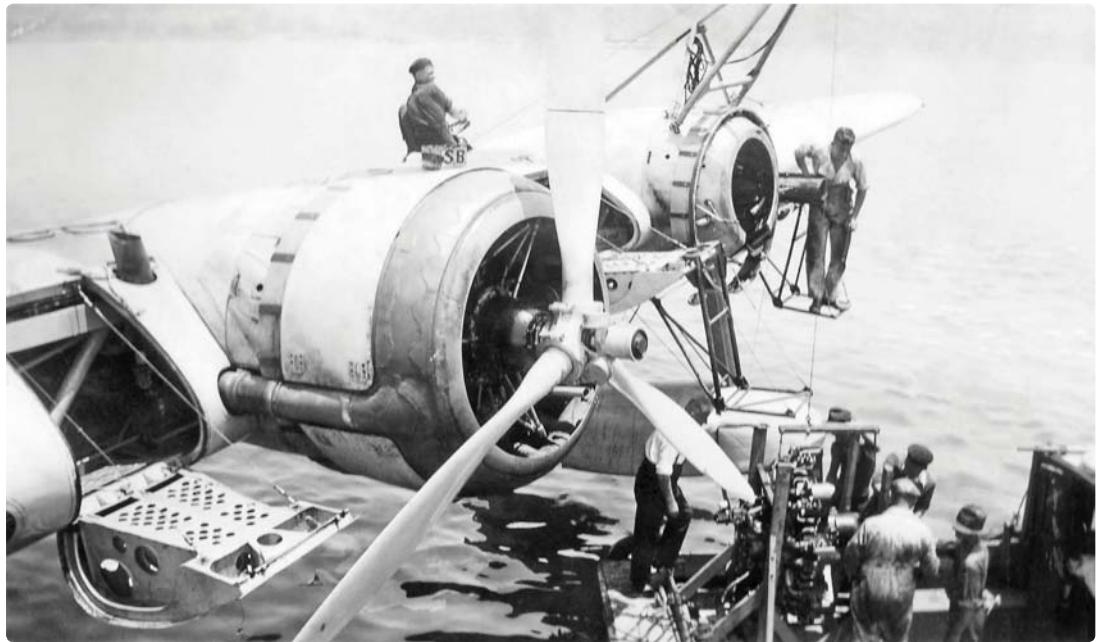
Early proposals received from the ARB outlined a simplification of the British procedure by cutting the Air Ministry out of the CoA renewal process altogether and allowing the ARB to renew the Australian CoAs on delegation. This was rejected by the CAB, which, as noted above, did not favour the introduction of unique procedures for the Australian fleet.

STALEMATE AND COMPROMISE

One major issue concerned the availability of maintenance records in Australia. Initially, the British were reluctant for records to be kept in Australia as the plethora of complex paperwork required by the "continuous CoA" system could easily get out of synchronisation between Britain and Australia. However, the Australian authorities, led by Berg, were insistent that full maintenance records for the Australian 'boats' at least had to be available in Australia, although the primary records could be kept in England.

After a long period of negotiating, principally by Johnson in England, in August 1938 a proposal was put forward by IAL that the Australian





ABOVE Although most of the heavy maintenance on the Empire 'boats, including the Australian examples, was initially completed in England, it was sometimes necessary to undertake work in Australia. Here the port outer Pegasus of an Empire 'boat is changed at Rose Bay in late 1938. The new engine has been floated out to the flying-boat on a raft and the aircraft's own derrick has been rigged to lift it into the nacelle.

aircraft logbooks would be kept by QEA in Australia, but sent to Britain when CoA renewal was required. Copies of the "continuous CoA" progress charts would be held by QEA and IAL, and certificates would be exchanged between the companies covering any work done so that the charts could be kept up to date. Daily Reports would be sent to Sydney at the end of each voyage and used by QEA for posting logbooks.

As far as the British-registered Empire 'boats were concerned, which of course would also operate out to Australia, IAL was reluctant to supply duplicate maintenance records because of the amount of paperwork involved, since any one of about 30 flying-boats could be used. Imperial undertook not to despatch a flying-boat with any components that would become "time expired" before the aircraft returned to Britain. If any unscheduled work was required in Australia, the relevant information could easily be provided by telegram. Although the CAB was not happy with this position, it was not really in a position to insist otherwise.

The situation with engines was a little more complicated. Imperial proposed that the engine logbooks for the 34 Pegasus engines nominally owned by QEA should be kept in Sydney. However, because of the component interchange system used by IAL, the logbooks served only to record which components were installed in a given engine at any time. The histories of these components were kept on separate sheets. At overhaul, IAL proposed sending QEA an updated list of components and the hours run by each component. These would then be kept up to date from the Daily Reports.

With regard to wireless equipment, British regu-

lations did not require the keeping of a Wireless Logbook but Australian regulations did. The CAB did not see any reason why the Empire 'boats should be permitted to depart from Australian regulations and insisted that a Wireless Logbook be kept for the Australian 'boats.

On September 1, 1938, the CAB sent a signal to Johnson, still in England, accepting the British proposals subject to minor changes and instructing Johnson to write to the ARB and Air Ministry to approve formally the British authorities to renew the CoAs for the Australian Empire 'boats on the CAB's behalf. Although Australian official forms would be used to record the required information, the process would follow normal British practice.

THE FINAL FRAMEWORK

After nearly a year of negotiations, made all the more difficult and protracted through necessarily being conducted by telegram at long range, it seemed that an airworthiness-control position had been arrived at that all the parties involved were comfortable with. The novel problems of having to find a way to work within the ICAN and various national requirements and procedures had been solved in an eminently practical way, although at the expense of considerable complication and duplication of administrative



QANTAS HERITAGE COLLECTION

ABOVE Following Britain's isolation in 1940, Qantas began to develop its own overhaul capability, although most were performed by BOAC in Durban until that, too, was cut off in 1942. Seen here is G-AFPZ Clifton, operated by BOAC (formed in November 1939 with the merger of IAL and British Airways), in the hangar at Rose Bay circa 1941.

work. In part, this was due to the then-innovative maintenance practices adopted by IAL in order to manage more efficiently the complex CoA renewals for the Empire 'boats and their engines. These practices worked well for IAL, but introduced a huge amount of difficulty when applied across organisational and, especially, international boundaries.

The arrangements would have been simpler if the Australians had put the management of all CoA matters in the hands of IAL and the British authorities. However, the Australian position all along had been one of maintaining sovereign control over the airworthiness of the Australian-registered 'boats — a reasonable objective. This in turn stemmed from the Australian insistence that a proportion of the EAMS flying-boats should be Australian-owned. Without access to the full maintenance records of the Australian 'boats, meaningful control was not possible. A degree of scepticism felt in Australia about some aspects of British airworthiness standards and practices may have influenced this view, but there was also the longer-term matter to consider of developing an overhaul capability for these aircraft in Australia.

The Australian section of the EAMS commenced in August 1938 but in the event only ran for little more than a year before it was suspended on the outbreak of the Second World War. The Empire flying-boats continued to ply the route between

Australia and Britain until the German invasion of France cut the route in 1940. The western terminus of the route then shifted to Durban in South Africa, with the flying-boats operating the famous "Horseshoe Route" up through Africa and the Middle East and out to Australia via India and the Far East. Throughout this period, CoA renewals for the Australian 'boats continued to be completed in Britain and, later, Durban, under the arrangements worked out in 1938. However, when the Horseshoe Route was cut in 1942 by the Japanese invasion of the Netherlands East Indies (now Indonesia), QEA, which had steadily been developing its engineering capability, took on responsibility for these overhauls in Australia, vindicating the Australian strategic goal of developing an independent overhaul capability.²⁰

The enduring legacy of the airworthiness-control problems of the EAMS was the demonstration that it was possible to work co-operatively around the rigid national delineations established by the 1919 Paris Convention, subsequently continued under the 1944 Chicago Convention, which in turn established the basis for post-war international civil aviation.²¹ Today, the interchange of aircraft, crews and maintenance activities between nations is relatively common, and the administrative machinery to facilitate it is well established; but in the late 1930s this was a unique achievement.



ENDNOTE REFERENCES

- 1 "Dry leasing" — the lease of an aircraft only, not including crew and fuel; The lessor normally provides the latter and usually at least first-level maintenance. "Offshore maintenance" is the practice of having aircraft maintained in a foreign country.
- 2 Convention Relating to the Regulation of Aerial Navigation, signed in Paris, October 13, 1919 (Government of the Commonwealth of Australia, Victoria, 1920). These principles still hold today.
- 3 ICAN, *Regulations concerning the Minimum Requirements for Airworthiness Certificates* (Paris, 1935).
- 4 *Australia, Britain and the Empire Air Mail scheme, 1934–38*, L. Edmonds, *Journal of Transport History*, 20:2 (1999), pp91–106. See also *Servants of the National Interest?*, Peter Ewer, Australian Historical Studies No 129 (2007), pp52–70; *Qantas at War*, W.H. Fysh (Angus & Robertson, Sydney, 1968); *The Defeat of Distance*, J. Gunn, (University of Queensland Press, St Lucia, 1985).
- 5 Peter Ewer argues convincingly that the selection of flying-boats over landplanes for the EAMS was a mistake brought about by British flawed planning assumptions and an unwillingness to take specialist advice. See *A Gentleman's Club in the Clouds: Reassessing the Empire Air Mail Scheme 1933–1939*, Peter Ewer, *Journal of Transport History*, 28:1 (2007), pp75–92.
- 6 These conditions are embodied in the Australian enabling legislation, the Empire Air Service (England to Australia) Act 1938 (Commonwealth of Australia, Canberra, 1938).
- 7 The USA signed but did not ratify the 1919 Paris Convention and therefore American CoAs were not accepted as the basis for registration in Australia. This was mainly a political position and was worked around administratively following the change of policy in 1935.
- 8 *Airworthiness Control — Some Highlights of its Development in Australia*, B.A.J. Scopes, *Australian Aeronautics 1927–1977* (Royal Aeronautical Society, Australian Division, Parkville, 1977), p18.
- 9 Australia did recognise British CoAs when aircraft were imported as the basis for the issue of an Australian CoA. A full CoA inspection of the aircraft by an Australian-licensed engineer, signed off by a departmental inspector, was also required.
- 10 *Air Crash Vol 1*, G.M. Job (Aerospace Publications, Weston Creek, 1991).
- 11 National Archives of Australia (NAA), Melbourne, MP115/1 8/103/916, *Airworthiness and Maintenance of Short Empire Boats S.23*; A.G. Berg to A.H. Cobby, minute from *Airworthiness of Short 'C' Class Boats in Australia*, May 11 1938.
- 12 The origins of the ARB are described in *Safety Regulation — the First 100 Years*, J.C. Chaplin, *Journal of Aeronautical History* (Royal Aeronautical Society), Paper No 2011/3, pp75–96.
- 13 The roles of these organisations, in so far as they relate to the subject at hand, are set out in documents in NAA file MP115/1 8/103/916. Except where otherwise noted, the following sections are based on documents on this file.
- 14 For example, the logbooks of the author's own aircraft, Cessna 175A VH-RFU, c/n 56296, contain numerous pasted-in certifications covering completed maintenance work since its initial registration in 1959.
- 15 At this time the Pegasus Xc fitted in the Empire 'boats had an overhaul life of only 250hr, with a five per cent allowance if the engine was still within limits. The Pegasus overhaul life had been, however, extended to 600hr by the mid-1940s. MP115/1 8/103/916, R.H. Mayo, *Report on Replacement of the Fleet Under the Empire Air Mail Scheme* (Imperial Airways, London, September 16, 1939) and *Flying Empires: Short "C-Class" Empire Flying-boats*, B. Cassidy (Queens Parade Press, Bath, UK, 1996).
- 16 This section is based on NAA documents in file MP113/1: VH/ABA MAIN FILE, VH-ABA *Carpentaria* and MP113/1: VH/ABB MAIN FILE, VH-ABB *Coolangatta*.
- 17 It seems likely that because Britain had a comparatively large aircraft manufacturing industry, the British authorities made special provision for aircraft for sale to foreign nations to be test-flown under their foreign registrations but on a British CoA in the expectation that they would be re-registered once delivered to the customer. Under ICAN Regulations a British CoA was necessary first in order to obtain a CoA in the operator's own country.
- 18 This is clear from newspaper photographs of the aircraft arriving in Australia. See, for example, *Morning Bulletin* (Rockhampton), April 4, 1938, p9, for a photo of VH-ABB *Coolangatta* alighting in Brisbane on its delivery flight. *Coolangatta* was not registered in Australia until April 19.
- 19 MP115/1 8/103/916, op cit
- 20 Based on file MP115/1 8/103/916 as well as the individual aircraft files for all Australian-registered Empire flying-boats (nine in all) held in NAA. QEA had also been undertaking the overhauls for four Empire 'boats chartered by the Royal Australian Air Force in 1939 and 1940. See also *Qantas at War*, op cit; *Challenging Horizons*, J. Gunn, and *Front-line Airline*, E. Bennet-Bremner, (Angus & Robertson, Sydney, 1944).
- 21 Convention on International Civil Aviation, Chicago, December 7, 1944; see www.icao.int/publications/Documents/7300_orig.pdf

BELOW An original hand-coloured postcard of the first S.23 to be delivered to QEA, VH-ABB Coolangatta, possibly on its delivery flight, at Townsville, Queensland, in March 1938. The aircraft was delivered with its Australian registration despite not being officially registered there; at this stage it was still technically G-AFBK.

W.J. LAURIE VIA AUTHOR





BAPTISM OF WAR

To mark the 60th anniversary of one of the most geopolitically significant conflicts of the Cold War period, Middle East military aviation specialist **TOM COOPER** uses official Egyptian documentation — a great deal of which has only come to light in the past decade — to provide the most accurate account yet published of the nation's aerial activities during the Suez Crisis of 1956

WHILE MOST ACCOUNTS of the so-called "Suez Crisis" of 1956 published in the West have been presented from the British, French or Israeli perspective, this feature is based on official Egyptian documentation. This includes the Egyptian Air Force's Eastern Command War Diary and interviews with members of the Egyptian forces which participated in the conflict, notably Air Vice-Marshal Gabr Ali Gabr EAF, who flew Vampires during the Crisis before becoming an official EAF historian in the 1980s. Much of the information herein updates what has previously been published in sources such as the excellent *Wings Over Suez* (Grub Street, 1996), Dr David Nicolle's article *Suez: The Other Side* in *Air Enthusiast* Issue No 111 (May/June 2004) and *Arab MiGs: Vol 1* (Harpia Publishing, 2009), co-written by this author and Dr David Nicolle.

Origins of the Crisis

Many Western sources maintain that Egypt's decision in the mid-1950s to order Soviet-designed Mikoyan-Gurevich (MiG) fighter jets was a primary reason for the outbreak of hostilities in the Middle East in 1956. From the Egyptian point of view, the genesis of the conflict is much more complex.

In 1952 the Free Officers Movement — a group established in the armed forces of Egypt and Sudan in the immediate post-war period — staged a *coup d'état* against King Farouk of Egypt, who was exiled, with all power being vested in the Revolutionary Command Council (RCC). Motivated by nationalism, the new regime was a hotbed of hopes and plans, one of which was a desire to improve Egypt's relations with Great Britain and the West in general, but to do so from a standpoint of equality.

To the frustration of the RCC — especially its emerging leader and then President of Egypt, Gamal Abdel Nasser — relations with Britain failed to improve, owing to London's reluctance to treat the Egyptians as equals. Peace with Israel, another of the RCC's original aims, also failed to materialise. Although Nasser repeatedly expressed tolerance and respect for Egypt's new neighbour — going so far as to enter secret peace negotiations with the Israeli Prime Minister Moshe Sharett — hawkish individuals around Israel's first Prime Minister, David Ben-Gurion, and the Chief of Staff of Israel's Armed Forces, Moshe Dayan, moved to sabotage such efforts.

Throughout 1954 the Israeli secret services launched a campaign of terrorist attacks on



ABOVE Gamal Abdel Nasser, one of the leaders of the overthrow of King Farouk of Egypt in 1952, became the nation's second President in June 1956 at the age of 38. Nasser's commitment to pan-Arab unity made him one of the most powerful leaders in the region — and set him on a collision course with the Western superpowers and the still-young state of Israel.

Western interests in Egypt (Operation *Susannah* etc), while in 1955 the Israeli Defence Force (IDF) undertook a series of escalating raids against Egyptian positions along the ceasefire lines of the 1948–49 Arab-Israeli War.

Such experiences began to change Nasser's priorities. While refusing American military aid offered by President Dwight D. Eisenhower's administration in 1954, by early 1955 Nasser had begun seeking arms from Washington DC and London. The British, already in the process of withdrawing from their military bases in Egypt, turned all such requests down, while the Americans demanded basing rights in Egypt and the latter's membership of the newly-established Central Treaty Organisation (CENTO) in return.

Establishing a modern air force

Humiliated by the Israeli cross-border raids, senior Egyptian military officers became keen to modernise and expand all branches of the nation's armed forces. However, the delivery of orders for arms placed by Cairo in the UK were repeatedly interrupted by a series of embargoes. Nowhere was this felt more keenly than with orders for new equipment for the Egyptian Air Force (EAF). Nearly 50 per cent of aircraft ordered for the EAF in 1949 — and more than 90 per cent of aircraft ordered in 1950 — were impounded. Of some 350 aircraft ordered by

OPPOSITE PAGE, TOP The Egyptian Air Force was the first Middle East air arm to operate jet-powered aircraft, Gloster Meteors forming a considerable part of its early jet fighter force. The first of its F.4 variants, a trio of which is seen here over the Pyramids of Giza, was delivered to Cairo at the end of October 1949. PHILIP JARRETT COLLECTION



ABOVE In early 1950 the EAF received a total of 12 devalved Hawker Sea Fury FB.11s, diverted from production for the Fleet Air Arm. This example, serial "703", set a speed record on its ferry flight from Blackbushe in the UK to Almaza, near Cairo, in February 1950, Hawker's Assistant Chief Test Pilot Neville Duke taking 6hr 32min 10sec.

Egypt by 1953, only 12 Gloster Meteor F.4s, 12 Meteor F.8s, four Meteor T.7s, one de Havilland Vampire FB.5, 20 Vampire FB.52s, a few Vampire T.55s, 18 Supermarine Spitfire F.22s, 12 Hawker Sea Fury FB.11s, nine Avro Lancaster B.IIs and nine Handley Page Halifax A.IXs were delivered; barely a third.

Another embargo prevented Egypt from establishing a production line for licence-built Vampires at a newly constructed factory at Helwan, south of Cairo, despite expensive machinery having been paid for and put in place. This left the EAF with no alternative but to order 58 Vampires from Italian company Aermacchi in 1953, all of which were delivered by September 1955, but only under the guise of deliveries to Syria.

The supply of spare parts was equally intermittent and unpredictable, wreaking havoc with the EAF's training and expansion programmes, at a time when it was placing great emphasis on recruiting and training new pilots. The result was that while British intelligence reports confirmed the EAF's recruitment of excellent men with high morale and good general discipline, the air force was unable to undertake regular training or combat operations.

Throughout this period Egyptian military intelligence received regular reports — some true and some unfounded — about uninterrupted deliveries of jet fighters, tanks and other arms to Israel. As a result, the Egyptians unsurprisingly felt unfairly treated by the British and Americans.

From Nasser's perspective, the behaviour of the USA and UK was proof that the Western powers were siding with Israel against Egypt and the Arab world in general. As a result, he began seeking an alternative source of arms.

A red star rises in the east

In April 1955 Nasser met Zhou En-Lai, Prime Minister of the People's Republic of China, who explained that Beijing was dependent on Soviet supplies and promised to raise the matter of Egypt's requests for arms with the Soviets. On May 19, 1955, Nasser received a positive reply via the Soviet Embassy in Cairo.

Concerned that the acquisition of Soviet-designed and -built arms might make Egypt overly dependent on Moscow, Nasser offered the USA and the UK one last chance. Believing that the Egyptian President was trying to play them off against the Soviets, London and Washington responded with veiled threats. Left with no choice and alarmed by another series of Israeli raids on Gaza and Khan Yunis — added to Egyptian military intelligence reports about the latest delivery of French-built Dassault Ouragan and Mystère IVA fighter jets to Israel — Nasser decided to proceed with the Soviet arms deal.

As the talks reached an advanced stage, the Egyptian and Soviet delegations met in Prague, Czechoslovakia, to handle the last few details. Among other points it was agreed that the entire operation would be run through the Czechoslovakian government, borne out of both parties' common interest in not antagonising the



ABOVE Egypt's first two Meteors — F.4 serial "1401" (nearest camera) and T.7 two-seat trainer "1400" — over the Gloucestershire countryside before their delivery to Egypt, where they arrived on October 27, 1949. By the time the Suez Crisis erupted the EAF had received 12 F.4s, six T.7s, 12 F.8 fighters and six NF.13 nightfighter variants.

Western powers further. On September 27, 1955, Nasser publicly announced the Egyptian-Czech Arms Deal, stressing that its main purpose was "for defence, not for aggression".

The Czechoslovakians gave the arms deal the codename *Operation 105*, which stipulated the delivery of 80 single-seat MiG-15bis and six two-seat MiG-15UTIs, to be built by the Avia factory, in addition to 45 Ilyushin Il-28 light bombers, 20 Il-14 transports and 55 advanced trainers and helicopters produced in the Soviet Union. The first MiGs arrived by ship in Alexandria on October 1, 1955, and were transported by truck to nearby Dekheila Air Base (AB) for assembly and post-delivery test flights by Czechoslovakian personnel. A team led by Maj Josef Medun, including two pilots, five technicians, two doctors, two interpreters and a cook, then began the business of converting Egyptian pilots on to the MiGs.

Reports about the increased flow of French arms to Israel during the winter of 1955–56 prompted Nasser to negotiate two additional orders for military equipment. The first of these was placed in November 1955 and specified the delivery of 16 warships and three submarines. The other was concluded in May 1956 and, among other items, provided for the delivery of 24 examples of the more advanced MiG-17F.

By this time the Czechoslovakians had launched *Operation 104*, which related to the sale of 20 MiG-15bis and four MiG-15UTIs to Syria. For the sake of simplicity, all were delivered to Alexandria, where they were assembled and

test-flown at Abu Sueir AB (now known as Abu Suwayr). As two groups of Syrian pilots were already undergoing training in Egypt — one at the Flying College at Bilbeis, while the other was in the process of converting to Meteors — the decision was made to convert them on to the MiGs in Egypt.

A second group of Czechoslovakian advisers, led by Maj-Gen Jan Reindel and including three pilots, two technicians and an interpreter, arrived in Egypt in May 1956 to provide the conversion course for the Syrians. However, after the Syrian students had completed their ground course, their flying training proceeded slowly owing to repeated Egyptian failures to provide the necessary fuel. Thus all 24 Syrian MiGs were still at Abu Sueir in October 1956 but with no crews to fly them.

The nationalisation of the canal

Seeing large orders for Soviet arms as evidence of Egypt drifting into the Soviet sphere of influence, the USA and Britain withdrew ongoing financial aid for construction of the proposed Aswan High Dam. Keen to save the development of this crucial symbol of Egyptian modernisation, Nasser was left with no alternative but to nationalise the Suez Canal, which he announced on July 26, 1956. Although Nasser guaranteed that all stockholders in the Universal Suez Ship Canal Company would be paid the full price of their shares according to that day's closing price on the Paris Stock Exchange, the British and French governments



EGYPTIAN AIR FORCE ORDER OF BATTLE, OCTOBER 29, 1956 MAP BY MAGGIE NELSON

Unit	Base	Equipment	Remarks
Central Command — HQ: Almaza			
No 1 Sqn	Almaza	18 x MiG-15bis & 12 MiG-17F	CO Sqn Ldr Hinnaway; some aircraft at Kabrit
No 2 Sqn	Cairo West	20 x Vampire FB.52	—
No 3 Sqn	Almaza	20 x C-47/Dakota	12–14 aircraft operational; some aircraft at Fayid
No 4 Sqn	Dekheila	Misc light aircraft	—
No 7 Sqn	Almaza	20 x C-46	—
No 8 Sqn	Inchas	12 x II-28	—
No 9 Sqn	Inchas	12 x II-28	CO Wg Cdr Kamal Zaki; only four crews qualified; most aircraft at Cairo West, combined with No 9 Sqn
No 10 Sqn	Almaza	5 x Meteor NF.13	CO Wg Cdr Hamid Abdel-Ghafar; only four crews qualified; most aircraft held in reserve at Cairo West, combined with No 8 Sqn
No 11 Sqn	Almaza	C-47/Dakota & II-14	—
II-28 OTU	Luxor	20 x II-28s & II-28Us	—
Eastern Command — HQ: Ismailia			
No 5 Sqn	Fayid	8 x Meteor F.8	CO Sqn Ldr Mohammed Hilmi; unit originally based at el-Arish but withdrawn and apparently absorbed into No 40 Fighter Training Unit (FTU)
No 20 Sqn	Cairo West & Kabrit	12 x MiG-15bis	CO Sqn Ldr Mohammed Nabil al-Masry; in process of conversion to MiGs
No 30 Sqn	Deversoir & Kabrit	15 x MiG-15bis	CO Sqn Ldr Nazih Khalifa; fully operational
No 31 Sqn	el-Arish	Vampire FB.52s	CO Sqn Ldr Baghat Hassan Helmi; unit withdrawn from el-Arish; Vampires sold to Saudi Arabia, pilots undergoing ground course on MiG-15; most served with No 40 FTU during Suez War
No 40 FTU	Fayid	8 x Meteor F.4; 2 x Meteor NF.13; 10 x Vampire FB.52	CO Sqn Ldr Salah ad-Din Husayn; incorporated Nightfighter Flight with Meteor NF.13s; some sources refer to this unit as No 10 Sqn
MiG OTU	Kabrit	12 x MiG-15bis, 10 x MiG-15UTI	Included 20 x MiG-15bis and 4 x MiG-15UTI ordered by Syria, crews still undergoing ground training
EAF Flying College — HQ: Bilbeis			
Elementary Flying School		15 x Heliopolis Gomhouria (Egyptian licence-built Bücker Bestmann); 25 x Chipmunk; 20 x T-6/Harvard	
Advanced Flying School		15 x Spitfire F.22; 8 x Sea Fury FB.11; 20 x Fiat G.55; 7 x Yak-11	

EAF Flying College — HQ: Bilbeis

Elementary Flying School 15 x Heliopolis Gomhouria (Egyptian licence-built Bücker Bestmann); 25 x Chipmunk; 20 x T-6/Harvard
 Advanced Flying School 15 x Spitfire F.22; 8 x Sea Fury FB.11; 20 x Fiat G.55; 7 x Yak-11



ABOVE Egyptian ground staff manoeuvre a highly realistic wooden MiG-15 decoy into a badly damaged hangar at an unidentified air base in Egypt during the Suez conflict. Scores of these convincing mock-ups were destroyed by French and British pilots, who would return to base claiming to have despatched rows of neatly parked MiGs.

immediately denounced the decision as a flagrant violation of international law, while the USA immediately blocked all Egyptian assets abroad. Within days, Paris had opened negotiations with London and Tel Aviv for a joint invasion of Egypt.

Egyptian military intelligence soon received numerous reports of Anglo-French forces massing on Cyprus, Malta and at various bases in North Africa, but Nasser could not believe that the Western powers would launch an invasion. He changed his mind through September and ordered the Egyptian General Command to develop defence plans. Correctly assessing that any invasion would start with an all-out attack on its air bases, the EAF's C-in-C, Air Vice-Marshal Sidqi Mahmoud Sidki, ordered his units to prepare plans to disperse their aircraft to the greatest number of airfields possible, and then provide support for Egypt's ground forces.

The threat of a possible invasion thus caught the EAF midway through its conversion from British to Soviet combat aircraft; indeed, the fluid status of most of Egypt's flying units resulted in often contradictory foreign intelligence estimates of the EAF's combat strength. British assessments were massively exaggerated, while those of the French were rather more understated, and broadly similar to those prepared by Soviet advisers in Egypt at the time.

According to Egyptian records, the EAF entered the conflict with only 76 operational combat aircraft. It was found that high landing speeds and other peculiarities of the new Soviet-designed aircraft caused problems for EAF pilots accustomed to more forgiving British types. Indeed, some 17 MiGs were seriously damaged

or lost in accidents during 1955–56. Although many were repaired and returned to airworthy status by Egyptian and Czechoslovakian technicians, only 64 MiG-15bis and MiG-15UTIs were deemed serviceable for the three EAF operational MiG squadrons and one operational training unit (OTU) as of October 29, 1956; roughly half of these were operational at any given time. Nevertheless, with 60 pilots having successfully converted to the new type before hostilities broke out, Egypt's MiG-15 squadrons were better-staffed than Israel's recently re-equipped Ouragan and Mystère units.

Of greater concern for the EAF's senior officers was the unsatisfactory status of stockpiles of spares, weapons and droptanks, although this was expected to improve significantly with additional Soviet deliveries, and once all personnel had completed their conversion courses. For similar reasons, the Egyptians were not overly concerned about the comparatively poor condition of most of their remaining British aircraft either. Indeed, on October 25, 1956, Cairo donated five surplus Vampire FB.52s to Jordan.

The first Egyptian batch of 12 MiG-17Fs from May 1956 order arrived in Egypt in early October, with another delivery expected in the middle of the following month. The factory-fresh aircraft were quickly integrated into the EAF's No 1 Sqn, and six pilots had converted to the new type by October 29, 1956 (see EAF order of battle on facing page).

Israel strikes

For the Egyptians, the Suez conflict began with an Israeli para-drop to the east of Jebel Heitan (also known as the Heitan Defile) in the Sinai Peninsula during the afternoon of October 29,



LEFT Along with the Meteor, the de Havilland Vampire formed the backbone of the EAF's early jet fighter force, 21 British-built examples being supplemented by nearly 60 Italian-built FB.52s. Here a pair of EAF Vampires is seen in Turkey during their ferry flights in 1951.

BELOW Vampire FB.52 "1522" was built by de Havilland and given standard EAF markings. Note the last two Arabic numerals of the serial repeated on the nosewheel door. By 1956 most EAF Vampires were fitted with launch rails for 3.5-in Sakr unguided rockets. Artwork by TOM COOPER © 2016

1956. This Israeli operation exploited the fact that 12 Vampires of No 31 Sqn EAF — a unit usually deployed at el-Arish AB, only 30 miles (50km) from the Israeli border — had been sold to Saudi Arabia in early October, and its pilots were undergoing conversion to the MiG-15 at Fayid AB, north-east of Cairo. Reacting to the Israeli invasion, the EAF was ordered to attack the paratroopers near Jebel Heitan in co-operation with Egyptian ground forces, and to find and destroy any Israeli ground units advancing over the border into Sinai.

Shortly after dawn on October 30, four Egyptian Vampires of No 2 Sqn EAF, led by Sqn Ldr Bahgat Hassan Helmi, were sent from Fayid to reconnoitre along the Mitla Pass, 30 miles east of Suez. Owing to a blanket of thick fog over the pass, the Vampires continued eastwards for 95 miles (150km) until they spotted an Israeli armoured column approaching el-Thamed. As a result, four MiG-15s were scrambled as a first line of defence, two of the MiGs strafing the column to inflict heavy damage.

At 0915hr, as the fog cleared over the Mitla Pass, the other two MiG-15s attacked Israeli paratroopers near Jebel Heitan and damaged one Piper Super Cub (s/n 47) on the ground. Several flights of Meteor F.8s of No 5 Sqn and Vampires

of No 2 Sqn, all based at Fayid, launched attacks, causing extensive casualties and destroying numerous vehicles — but missing the Super Cub in which Moshe Dayan had reportedly just arrived to inspect the situation.

In response to the Egyptian air strikes, formations of Mystères and Ouragans began appearing over the battlefield, two of the former attacking an Egyptian infantry battalion on its way to the Mitla Pass. As additional EAF Meteor F.8s swooped down on the Israeli paras, a pair of Mystères appeared, but were engaged by Egyptian MiGs. Neither side lost any aircraft in this first air combat of the conflict.

Further north, at 1530hr, two Israeli Meteor F.8s were attacking the Egyptian 1st Armoured Brigade marching on Bir Gifgafa when they were intercepted by four (some reports say six) Egyptian MiG-15s. One Meteor withdrew and returned to base, while the other fell into a spin after a droptank failed to release. Egyptian military intelligence later reported that the Israeli pilot recovered at very low altitude to make a forced landing at his unit's base at Hatzor.

In the late afternoon, some 13 Israeli jets — six Mystères, two Meteors and five Ouragans — appeared in the skies over the Mitla Pass before continuing for the EAF base at Kabrit. Although





LEFT Three of the EAF's newly-operational Czechoslovakian-built MiG-15s overfly Cairo during a demonstration of Egyptian air power in September 1956. A dozen of No 1 Sqn's recently-introduced fighters provided the Egyptian public with a view of their nation's state-of-the-art front line of defence.

BELOW A poor quality but rare photograph of EAF pilots running to their MiGs during a scramble in early October 1956. The MiG-15bis was an improved version of the original MiG-15, incorporating an uprated engine and a strengthened structure to permit higher speeds.

supposedly ordered not to cross the Suez Canal, the six Mystères dived from 20,000ft (6,100m) to attack six MiG-15s of No 20 Sqn as they were taking off on a sortie against an Israeli column near Bir Hassana. One MiG-15 was shot down while climbing after take-off, its pilot ejecting safely, but Flt Lt Hussein Sidki claimed one Mystère IVA as shot down in return, although Israeli sources claim it was only damaged and returned to Hatzor.

Considered as an attack on Kabrit AB, this action was deemed by the Egyptians to be a provocation, and on the night of October 30 the EAF ordered a series of attacks on Israeli air bases by Ilyushin Il-28s of Nos 8 and 9 Sqn, despite their crews having only just finished converting to the twin-engined jet bombers. Two Il-28s each were launched to attack the airfields at Hatzor and Tel Nof, but both sorties proved ineffective. The Egyptians were satisfied, however, concluding that over the course of 80 sorties flown during the day, in addition to causing heavy losses to Israeli ground troops, EAF pilots had shot down an Israeli Mystère IVA and destroyed a Super Cub on the ground, while Egypt's ground-based air defences had shot down an Israeli Meteor and two North American P-51D Mustangs.

Expecting an escalation of fighting, EAF Eastern Command launched an all-out effort on October 31, beginning at dawn, when four Vampires of No 2 Sqn, led by Sqn Ldr Helmi, took off from Fayid to strike Israeli forces near the Mitla Pass. While changing from a tight two-pair vic formation to echelon for ground attack, they were jumped by Mystères, two of the Vampires being shot down. Helmi was killed, but Plt Off Ahmad Hassan Farghal baled out and was captured. Flight Officer Wa'il Afify was wounded when his Vampire was hit, after which he attempted to return to Kabrit but crashed five miles (8km) west of the Mitla Pass. Pilot Officer Gabr Ali Gabr managed to fire off a burst at one of the Mystères before the Israeli accelerated away, the Egyptian returning safely to Kabrit.

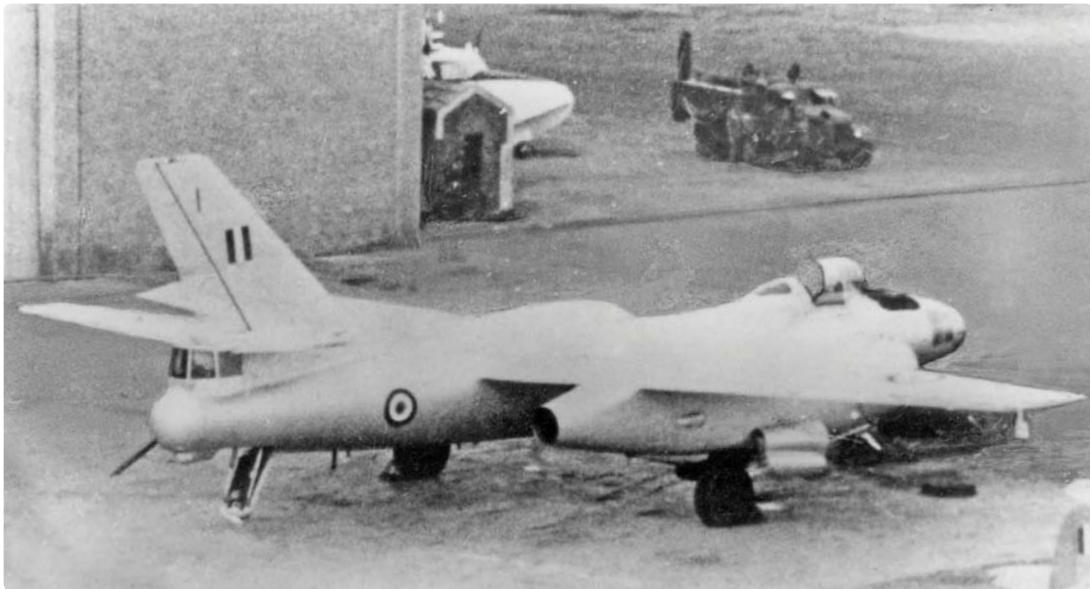
Learning the hard way

It had been an expensive lesson for the EAF, and orders were put in place that all further Meteor and Vampire operations were to be closely escorted by MiGs. The majority of Egyptian strikes that morning hit the Israeli paras in the Mitla Pass, before action switched to the northern and central regions of the Sinai around noon, in response to Israeli air strikes there.

Throughout the morning, Egyptian Army

NOUR BARDAI COLLECTION VIA AUTHOR





ABOVE Delivered at the end of 1955, Egypt's Il-28 twin-jet bombers were deployed to three units, Nos 8 and 9 Sqns based at Inchas, and the Il-28 Operational Training Unit at Luxor. This unidentified example was photographed at Almaza in 1957 during an exhibition celebrating the 25th anniversary of the formation of the Egyptian Air Force.

troops had put up heavy and accurate anti-aircraft fire, downing two Israeli North American Harvards over Abu Agheila in the early morning and damaging two Meteors over Umm Qatef.

When a pair of Israeli Ouragans attempted to attack the Egyptian 1st Armoured Brigade near Bir Gifgafa, they were intercepted by four MiG-15s, led by Sqn Ldr Nazih Khalifa, which were on their way to attack an Israeli column north-east of Bir Hassana. Khalifa damaged two enemy jets in a short clash: one managed to return to Hatzor, while the other was forced to make a belly-landing in the desert. On the way back to Kabrit AB, Khalifa's formation shot down an Israeli Piper Cub over the Mitla Pass.

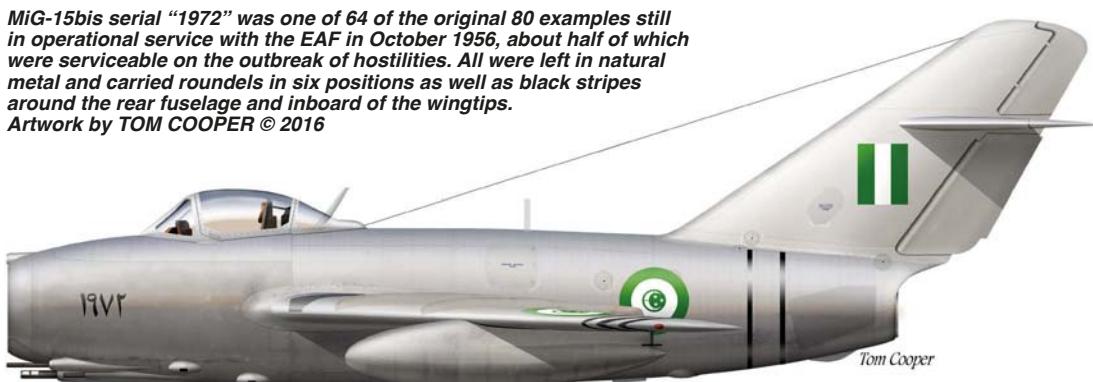
Another MiG flight was less fortunate. During an attack on Israeli tanks east of Abu Agheila, the MiG-15 flown by young EAF pilot Abd al-Rahman Muhamram was damaged by groundfire. While returning to base, he was jumped by

two Mystères, sustaining heavy damage to the starboard wing. Muhamram evaded his pursuers by descending to low altitude, but was finally forced to ditch his MiG in the shallow waters of Lake el-Bardawil. While the pilot escaped back across the Suez Canal, his aircraft was found by the Israelis, who promptly turned it into a major propaganda coup; photographs of Muhamram's MiG being inspected by Israeli pilots can be found in nearly all accounts of the Suez conflict.

Around noon, two flights of Syrian-owned MiG-15bis from Abu Sueir were heading towards Abu Agheila when they ran into two sections of Mystères north of Bir Hassana. The MiG flown by Plt Off Fuad Kamal was hit and entered a spin, forcing the pilot to eject. The other flight continued unhindered and attacked the Israeli ground troops, causing more losses.

At 1330hr one of three two-aircraft sections of MiG-15s from Abu Sueir were over central Sinai when an Ouragan formation was spotted below.

MiG-15bis serial "1972" was one of 64 of the original 80 examples still in operational service with the EAF in October 1956, about half of which were serviceable on the outbreak of hostilities. All were left in natural metal and carried roundels in six positions as well as black stripes around the rear fuselage and inboard of the wingtips.
Artwork by TOM COOPER © 2016





ABOVE By early October 1956 the first batch of MiG-17Fs had been delivered to Egypt and rushed into service with No 1 Sqn at Almaza. Although only six EAF pilots had converted on to the type (a substantially improved MiG-15 with an afterburning engine) by the outbreak of the Crisis, they flew numerous combat sorties during the conflict.

Diving towards the Ouragans, Plt Off Farouk el-Ghazzawy shot down one Israeli fighter, but was in turn hit by the other. The Egyptian pilot nursed his MiG back to Abu Sueir, where he was able to make a safe landing.

Half an hour later, another MiG flight intercepted two P-51s that had been damaged by anti-aircraft fire of the 1st Armoured Brigade and shot one of them down (contrary to Israeli records, which cite only one loss owing to aerial combat, a Cub, during the entire Suez conflict). Elsewhere, Egyptian anti-aircraft fire damaged 16 other Israeli fighter-bombers (including two Meteor F.8s and a Mosquito FB.6 that were forced to make emergency landings) and shot down several P-51s. Furthermore, when Israeli paras advanced into the "saucer" of the Mitla Pass in the afternoon, they were subjected to repeated air strikes from MiG-15s, Meteors, Vampires, Il-28s and even ageing Egyptian Sea Furies and Spitfires.

The EAF had completed 120 combat sorties by the early evening of October 31, having lost three MiG-15s and three Vampires. Its pilots claimed one Mystère, two Ouragans, one Mustang and one Cub as shot down. Furthermore, Egyptian ground troops claimed four more Mustangs, one Mosquito and two Harvards.

At this point, the EAF High Command was informed that Republic F-84F Thunderstorms in Israeli markings had been involved in the attacks on the 1st Armoured Brigade. Knowing that the IDF / AF had suffered heavy losses that day, the Egyptians were convinced that they were some way towards achieving air superiority over the Sinai. Emboldened, and to maintain pressure, the

EAF sent four Il-28s for another attack on Israeli air bases that night. One of the twin-engined bombers, flown by Sqn Ldr Mustafa Helmi, crashed on take-off, killing the crew, but Wg Cdr Hamid Abdel-Gafar bombed Tel Nof before returning safely to Inchas — only to find his base under attack by RAF bombers. The two Il-28s that attacked Hatzor missed their targets, but managed to evade interception by Israeli Meteor NF.13 serial "52", which was on patrol that night.

Enter the Musketeers

On the evening of October 30 a joint ultimatum had been issued by the French and British, stipulating the cessation of all hostilities on both sides, on threat of Anglo-French forces intervening "in whatever strength may be necessary to secure compliance". The fighting continued the next day, however, resulting in air strikes on Egyptian air bases by RAF bombers that evening, as mentioned above. This was a profound shock to many EAF personnel, many of whom still considered the British to be their friends and allies. Nevertheless, the EAF High Command issued an order for the dispersal and evacuation of aircraft. Nine Il-28s and one Il-14 were flown to Jeddah in Saudi Arabia, with a refuelling stop at Luxor, where they were photographed by an IDF / AF Mosquito, while No 1 Sqn EAF hid 24 of its MiGs by covering them with camouflage nets in a scrapyard outside Almaza on October 31.

With few Egyptian pilots qualified for night flying and a poor early-warning radar network, the EAF was hopelessly outmatched by an armada of RAF bombers during the night of

Adorned with the black and yellow "Suez stripes" painted for identification purposes on British and French aircraft during the conflict, seven English Electric Canberra B.6s of No 12 Sqn RAF await the next political move at RAF Luqa on Malta in late September 1956. The aircraft would take part in the Anglo-French Operation Musketeer a few weeks later. TAH ARCHIVE



RIGHT Squadron Leader Shalabi el-Hinnawy, Commanding Officer of No 1 Sqn EAF during the Crisis, was the leading Egyptian fighter pilot of the conflict, and is seen here in the cockpit of one of the 12 Meteor F.8s delivered to the EAF in the early 1950s. He would go on to become the Commander-in-Chief of the Egyptian Air Force during 1967–69.

October 31. Only Sqn Ldr Husayn and his wingman got airborne in a pair of Meteor NF.13s to claim a Vickers Valiant as damaged, but the bomber, B.1 XD819 of No 148 Sqn, actually came away untouched.

At dawn on November 1, six MiG-17s of No 1 Sqn were launched from Almaza, Flt Lt Sayd el-Qadi claiming damage to one of the RAF's reconnaissance Canberras; his superiors, however, subsequently deemed his report untrustworthy and punished him. Led by Sqn Ldr Shalabi el-Hinnawy, four of the MiG-17s flew a strike on well-camouflaged Israeli paras near the Mitla Pass.

All six of these aircraft and one Il-28 were to be destroyed on the ground at Almaza during successive air strikes undertaken by British and French fighter-bombers. At least four MiGs were destroyed at Cairo West, and about a dozen at Abu Sueir. However, most of the EAF's jets were evacuated to airfields in Upper Egypt or stretches of straight highway in the Nile Delta, while at least ten EAF MiG-15s and three Syrian MiG-15UTIs were flown to Syria. In their place,



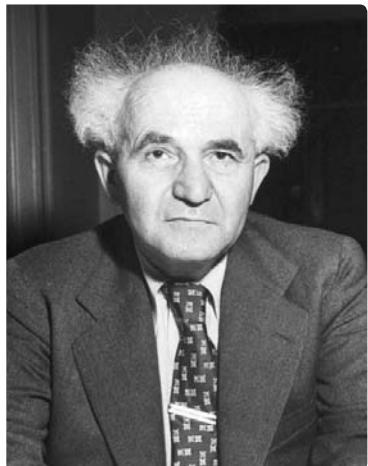
SHALABI EL-HINNAWY COLLECTION

scores of extremely realistic wooden dummies were subsequently claimed as destroyed by British and French fighter-bomber pilots. In contrast, because there were not enough crews to evacuate all the Il-28s, and most of the training aircraft were left parked in the open, Inchas and Bilbeis suffered much more.

For the next few days, the EAF ceased operations and limited itself to waiting for the prospective ground invasion. Day after day of continuous aerial bombardment, however, began to take a serious toll on the morale of the Egyptian military and its leaders, but the situation suddenly improved on November 5, when it became known that London and Paris were under increasing pressure from the USA and Soviet Union to withdraw their forces from the conflict, neither of the latter superpowers

The only combat aircraft in EAF service to wear camouflage during the Crisis were the five Meteor NF.13s still in service with No 10 Sqn at Almaza, including "1428", as seen here. The nightfighters were painted in Medium Sea Grey and Dark Green and wore the standard roundels and fin flashes, but no fuselage or wingtip black stripes. Artwork by TOM COOPER © 2016





ABOVE *The three Musketeers — from left to right; British Prime Minister Sir Anthony Eden, whose reputation was severely damaged by his handling of the Suez Crisis; Guy Mollet, France's Prime Minister from February 1956, and David Ben-Gurion, Israel's Prime Minister, with whom Eden and Mollet conspired in secret to attack Egypt.*

seeing any favourable geopolitical outcomes from it. In light of this development, Flt Off Nabil Kamil flew a single sortie in a MiG-15bis over Port Said on November 6, even if only to demonstrate that the EAF was still active. By the following morning, a United Nations-negotiated ceasefire was in effect.

The final tally

From the Egyptian perspective, the conflict did not end on November 7, 1956, but lasted another 120 days, by which time the Anglo-French forces had completed their withdrawal from Egypt, and the Israelis had withdrawn from the Sinai Peninsula (on March 6, 1957).

From the EAF's point of view, the conflict had caused significant damage to its air bases, but not the crippling losses claimed by the British, French and Israelis. For example, the British reported no fewer than 105 MiG-15s and -17s as destroyed, whereas by the end of the nine-day conflict 32 EAF MiG-15bis and at least six MiG-17Fs remained fully serviceable.

While the French reportedly destroyed 20 Il-28s during a single strike against Luxor airfield on November 2, they actually accounted for only six on that occasion. The Egyptians managed to evacuate safely 37 examples of the twin-jet bomber. Similarly, Egyptian personnel losses were kept at an absolute minimum; only two EAF pilots are known to have been killed during the conflict. Once UN peacekeepers had been deployed to Egypt to separate the belligerents, the EAF returned its evacuated aircraft to Egypt and continued to build up its strength with the addition of more MiG-17Fs from Czechoslovakia.

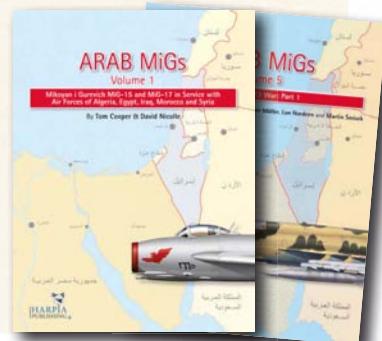
Generally, Egyptians concluded that the Suez conflict had culminated in a clear-cut victory for Egypt, as Cairo had achieved its political

objectives in becoming the *de facto* owner of the Suez Canal, with the exclusive right to operate it without any interference or objection. For Britain and France, their last gasps of colonialism in the Middle East were an unqualified disaster with far-reaching geopolitical consequences. Instead of removing Nasser, it was the British and French leaders, Anthony Eden and Guy Mollet respectively, that had been ousted by the summer of 1957. Indeed, Egypt's international prestige grew enormously and Nasser became the undisputed figurehead of Arab nationalism until his death from a heart attack in 1970.

Although commonly portrayed as the nominal "winner" of the conflict — at least in terms of materiel it recovered from the Sinai — Israel's involvement in the tripartite plot destroyed any chance of a negotiated settlement with Arabs for another 20 years.



TOM COOPER is a co-author of the indispensable *Arab MiGs* series published by Harpia Publishing, incorporating six volumes detailing the Cold War history of Soviet military aircraft in the Middle East. For more information on the Suez Crisis see *Arab MiGs Volume 1: Mikoyan i Gurevich MiG-15 and MiG-17 In Service With Air Forces of Algeria, Egypt, Iraq, Morocco and Syria* (ISBN 978-0-982553-9-23, RRP £34.99). For full details of Harpia's extensive book catalogue visit the website at www.harpiapublishing.com.



Horace Austen Buss poses in the cockpit of the Blackburn Monoplane shortly after having gained his Royal Aero Club Certificate in February 1913. Buss would become one of the early Royal Naval Air Service pioneer pilots. Although he is referred to in many sources as Harold Buss, he was most definitely a Horace!

AUTHOR'S COLLECTION



Major Horace Buss

Home and abroad with the Royal Naval Air Service 1914–18

With the help of the logbooks and memories of his grandfather — First World War Royal Naval Air Service pilot Horace A. Buss — **MARTIN PARRY** pieces together a distinguished wartime flying career, which included fighter operations in the UK, France and the Dardanelles, before night-bombing duties with the gargantuan Handley Page O/100



Horace A. Buss.

I SUSPECT THAT, like me, a good many readers of this journal were bitten by the flying bug at an early age. The catalyst for my own interest was a large collection of photographs taken by my grandfather, Major Horace A. Buss DSC OBE, when he was a pilot in the First World War; pictures which I would spend hours poring over but about which he refused to say anything at all. Not until the very end of his life did he ever open up about his flying or what he had done in the war. I believe two coinciding events made this happen. The first was when I started to learn to fly myself, and the second, shortly afterwards, was when historian Dr Peter H. Liddle visited him and interviewed him for his book, *The Airman's War 1914–18* (Blandford, 1987).

It was also at this time that my grandfather produced something I had been unaware of until then; his wartime logbook, the original of which is now in the Liddle Collection in the Brotherton Library at the University of Leeds. The recorded interview he gave to Peter Liddle, together with his logbook and what he eventually related to me, form the basis of what follows. I am also indebted to aviation historian Vic Flintham for sharing his encyclopaedic knowledge of vintage aircraft, and who helped me identify many of the aircraft in the accompanying photographs.

The son of a farmer, Horace Austen Buss was born in 1890 at St Nicholas-at-Wade on the Isle of Thanet at the easternmost tip of Kent. The village itself is within just a few miles of two places which were to feature heavily in Horace's future wartime career. As the exploits of astronaut Maj Tim Peake CMG have been fuelling the imaginations of boys and girls recently, it was an event on a smaller scale, albeit of hugely greater historical significance, that grabbed his.

In 1903, when Horace was 13, the Wright brothers made their historic first flight — but it was not until Horace was 20 that he saw an aeroplane in the sky for the very first time. This was when he cycled across London to watch Claude Grahame-White take off in the *Daily Mail's* London—Manchester air race in 1910. That made his mind up; somehow he was going to fly. At the time Horace was just finishing studying engineering in London, after which he was apprenticed to Blackburn Aircraft in Leeds as a wood- and metalworker.

Earning wings

When Blackburn opened a flying school at Hendon, Horace managed to get transferred there and have his wages paid in part as flying lessons. After 4hr of training on single-seaters, much of which was reported in the British

AUTHOR'S COLLECTION



ABOVE Horace Buss aloft in the sole Blackburn Single-Seat Monoplane over Knavesmire, part of York racecourse, in June 1914. The aircraft, powered by a 50 h.p. Gnome engine, was put into storage upon the outbreak of war later that year, and was rediscovered by Richard Shuttleworth in 1938. It still flies today with the Shuttleworth Collection.

One of a number of biplanes evolved from an original monoplane design by Rumanian aeronautical pioneer Henri Coandă, the Bristol T.B.8 first flew in August 1913, before going on to serve with the RNAS on patrol and training duties during 1914–16. This example, 1226, is one of the first batch of 12 delivered to the RNAS in November 1914.



weekly magazines *Flight* and *The Aeroplane*, Buss was awarded Royal Aero Club Certificate No 409 on February 4, 1913.

With war imminent Horace applied to the Admiralty as a pilot but, with an unfortunate lack of official foresight, he was turned down, as it was not looking for pilots at the time. However, that had all changed within a few months. As soon as war was declared, Horace was sent a telegram ordering him to report to Eastchurch on the Isle of Sheppey in Kent, to be commissioned into the Royal Naval Air Service (RNAS) as a Flight Sub-Lieutenant for Temporary Service (upgraded to Flight Lieutenant for Temporary Service on December 31, 1914). Initially the posting was essentially for further training, flying various types including Avros and Farmans, but it wasn't long before Horace was flying patrols along the Kent coast looking for enemy aircraft. German bombing raids along the UK's east coast, which ultimately killed more than 700 civilians during the war, were the cause of much public concern and some panic at the time.

Into action

Horace's first operational flight appears to have been made during the mid-morning of Christmas Eve, 1914, as he recalled:

"A solitary German aeroplane [a Friedrichshafen FF 29 floatplane] came over and dropped a bomb in Dover harbour. There was a thought that we were going to be invaded at any moment, so two of us were sent off in Bristol [T.B.8] two-seaters [serials 1223 and 1224], the other seat being occupied by [observer Flt Sub-Lt Aylmer Fitzwarine] Bettington, to fly continuous patrols on Christmas Eve, Christmas Day and Boxing Day."

The remarks column in Horace's logbook records Christmas Eve as being "very cloudy

and foggy", and Christmas Day as fine and clear.

A few months later, the April 17, 1915, edition of *The Times* reported the following:

"A German aeroplane flew over Kent this afternoon [referring to the previous day] and dropped nine bombs on Faversham and Sittingbourne without doing any damage. The machine was first sighted from Deal, shortly before 12 o'clock, flying at a great height. It visited Faversham, Sittingbourne and Sheerness in turn, went across the Isle of Sheppey, turned inland again, and flew over Canterbury, disappearing a few minutes before 1 o'clock.

"The course taken was so erratic that for some time it was believed that there were two aeroplanes. Its movements were largely directed by the opposition it encountered. It was easily driven off from the neighbourhood of Faversham. It approached from the south-west, described a wide semi-circle, and then continued its irregular course.

"Later a British aeroplane set out in pursuit. The German at once made off and, travelling at great pace, was soon out of sight of Faversham. An exciting chase followed. The German had an excellent start, and by flying at an altitude which at times reached 8,000ft [2,500m] or 9,000ft [2,800m], it was able to make the task of the pursuer very difficult. Four ordinary bombs and one incendiary were thrown at Faversham. The second bomb fell in the edge of the Mall cricket ground, within a few yards of the Ashford road. One of the exploding missiles was thrown in the middle of the road, but did nothing but make a small pit in the surface.

"The Reverend S.H. Chapman, chaplain of the almshouse, and Police Constable Hopper had narrow escapes. The third bomb fell in the cricket field at the Mount, near a South Eastern [railway] level crossing. A signal-box was missed by a few yards only. The fourth bomb alighted in



LEFT Buss (furthest right) with his colleagues from A Flight, No 2 Sqn RNAS, when the unit was operating on Home Defence duties from Westgate-on-Sea. The others are, from left: Flt Sub-Lt R.H. Mulock; Buss's regular observer Flt Sub-Lt Bettington and Flight Commander A.B. Gaskell.

AUTHOR'S COLLECTION

BELOW A pair of Royal Aircraft Factory B.E.2cs flank a Deperdussin Monoplane, both types flown by Buss during his wartime flying career, at Felixstowe in 1915. The 100 h.p. Gnome-engined Deperdussin saw RNAS service in small numbers.

a garden at Preston village. The fifth buried itself in a fruit plantation.

"Lord Harris, Vice-Lieutenant of the county, who lives in the neighbourhood, tells me that the people of Faversham were in no alarm at the visitation, and that instead of taking to cellars as they had been advised to do in the event of an air raid, they crowded into the streets and watched the movements of the German machine as if it had been a flying exhibition given for their special benefit.

"The only damage done at Sittingbourne by the raider was the killing of a blackbird, which was sitting in the bough of an apple tree."

In his logbook for April 16, Horace records: "12.32; Avro [504B] 1011; height 5,000ft [1,500m]; Westgate to Eastchurch . . . scouting for German aeroplane [an Army Albatros B II] which dropped bombs on Faversham and Sittingbourne". Even if he had managed to get a few thousand feet higher it is doubtful he could have done much about it, as he recalled later: "Our armament consisted of a 12-bore

shotgun and a pistol, and if I remember rightly the shotgun fired three balls and a chain. It was supposed to cut through the struts of the aeroplane; that was the only armament we had."

Engine failures were a fairly common occurrence, including one on April 19 at 0720hr with Bettington as observer. Horace remarked: "Engine failed over The Swale, chassis smashed in landing owing to machine hitting ditch". Typically, Buss and Bettington were airborne again two hours later in a different machine.

To foreign climes

Over the next few months patrols along the Kent coast and inland continued, interspersed with wireless tests, while flying various aircraft types including those of Short Bros, Farman, Deperdussin, Vickers, Bristol, Sopwith, Blériot (very briefly) and Avro.

At 1000hr on August 5, 1915, Horace set off for France, flying from Folkestone to Dunkirk in an Avro 504 in 1hr 20min. The next week saw him undertaking reconnaissance flights and test-

PHILIP JARRETT COLLECTION





ABOVE In June 1915 No 2 Sqn RNAS was reformed as No 2 Wing, which was deployed to the Dardanelles two months later. This group photograph of No 2 Wing's C Flight, with Buss seated third from right, was taken at Imbros in 1916, with an Avro 504B as a backdrop, although the unit used a wide variety of types while in Turkey.

flying a Nieuport, which he found "very nice in the air but difficult to land and control on the ground". The following day, in the same aircraft, he was spotting for a "big gun" at 12,000ft [3,600m] and reported "no movements observed among the enemy, but puffs of smoke seen like shells falling". On August 10, back in an Avro, he dropped four bombs on an airship in Ostend harbour and recorded that he was "heavily fired upon, and machine struck by pieces of shell at 9,000ft [2,700m]".

Other comments from the logbook around this time give a flavour of Horace's day-to-day activities: "climbing test — 6,000ft [1,800m] in 25min"; "engine cowl came adrift"; "wind at 1,000ft [300m] 45 m.p.h. [72km/h]". And so it went on until August 12, when Horace was ordered to return and prepare for a move to the Dardanelles in north-western Turkey. After a stop in Malta — which afforded Horace a bit of relaxation and sightseeing — he and his RNAS colleagues recommenced operations in Turkey with No 2 Wing on September 25, 1915.

The flying there was a continuation of his short spell in France, namely reconnaissance and spotting for the Royal Navy's battleships and monitors. Based on the island of Imbros (now Gökçeada), Horace was involved with identifying a target and "circling around the monitor perhaps for an hour trying to get it on target. It was a very tedious business. There was

no radio, it all had to be done by tapping out the positions". This was mainly done in an Avro 504, which he described as "a horrible thing".

Among the comments in Horace's logbook, two stand out as probably requiring an extra stiff drink at the end of the day. December 9, 1915: "Reconnaissance to Suvla; engine stopped on my way home. Landed in sea and picked up by monitor [HMS] Earl of Peterborough". And on Christmas Day a few weeks later: "Spotting at Helles. Attacked by German machine and received 12 bullets through machine".

A few days earlier he had his first 10min flight in a Voisin at 1000hr followed by a 2hr 30min reconnaissance flight at 8,000ft (2,400m) in the same aircraft. As before, converting on to a new type seemed to be a fairly casual affair. In early January 1916 Horace was homeward bound.

Back to Blighty

Based at Westgate-on-Sea, Horace resumed operations on January 6, 1916, flying patrols mainly with Royal Aircraft Factory B.E.2cs and Avro 504s on the hunt for Zeppelins and German aircraft and shipping, including submarines. Night operations were also undertaken.

On April 7, 1916, Horace records that he was tasked with "taking machine to Manston ground". He later recalled: "Westgate aerodrome was too small for night landings, so we used to take off from there and land in a field at Manston



ABOVE Despite Buss's dislike of it, the Avro 504 quickly proved to be one of the most ubiquitous aircraft in RNAS service. The 504C, as seen here, was a single-seat version created specifically for anti-Zeppelin patrols and used extensively by the RNAS. **B BELOW** Horace Buss homeward bound on the ship back to the UK from Turkey in 1916.

which we found — eventually the whole outfit moved to Manston". So began Manston's great history as a military and civil aerodrome.

This was a relatively pleasant time for Horace as Manston was just a few miles from his father's farm at St Nicholas. However, a new challenge was about to appear in the form of the mighty Handley Page O/100. This was the largest British aircraft of the day, with a span of 100ft (30m) and a pair of 320 h.p. Rolls-Royce Eagle engines.

Horace recalled: "They frightened me so much ... the size. I thought I hope they never ask me to fly one of those. The next thing of course was notice to transfer to the RNAS Handley Page Squadron [at Manston]". His maiden flight in one of these — his first in a twin-engined aircraft — was a 15min solo on December 8, 1916; something to think about for those about to start a twin rating! Having got used to this aircraft, he soon felt very differently about it and said later: "It was a delightful aircraft to fly and I was very fond of her. I liked the HP very much".

It seems that at this point Horace became involved in trials work with the O/100, as the word "test" appears often in the remarks column of the logbook, with several flights from Manston to Hendon, the Handley Page factory being at nearby Cricklewood. There is also a flight to Paris and Auxerre.

Although the O/100 was originally designed



AUTHOR'S COLLECTION

for a crew of four or five, it was decided that for night flying it would need fewer defensive weapons, so the crew was usually reduced to three and some armour plating was removed. There followed a period of intensive night-flying training and bombing practice; but on April 5, 1917, Horace, leading a flight of four O/100s, set off for Coudekerque, near Dunkirk, to join No 7 Sqn RNAS, having had to turn back the previous day owing to poor weather. He recalled later:



LEFT Horace Buss at the controls of a No 7 Sqn RNAS Handley Page O/100 on approach to Coudekerque, a few miles inland from Dunkirk, as seen from the rear gunner's position. Early daylight raids by No 7 Sqn's O/100s on U-boat bases along the Belgian coast were quickly suspended and replaced by nocturnal bombing sorties.

AUTHOR'S COLLECTION

BETWEEN Three O/100s of No 7 Sqn at Coudekerque, the nearest with its port wing still folded, are prepared for another bombing sortie. In July 1917 it was decided that the Handley Page squadrons would be restricted to ten aircraft apiece so No 7A Sqn was formed, becoming No 14 Sqn RNAS that December.

"During our training at Manston we had done some formation flying, mainly for our own amusement, so I thought we'd fly across like that. When we arrived I think they were so impressed they sent us up the coast in daylight to bomb any shipping. We were all horrified because the HP was most vulnerable to a fighter, being slow. Our CO [J.W.K. Allsop] tried to get out of it but they insisted, and the next day we went up the coast as far as Zeebrugge.

"Nothing happened that day, so they sent us the next day — and of course, one of us got shot down and the next day also. We thought, well, we shall all be finished before we've done a night raid at all. They did stop it and we then got on with our proper job."

Night life

Questioned by Peter Liddle about flying at night, Horace had the following to say:

"I don't know that we were worried much at the time. Of course it was an experience, but we got so used to flying and we felt more comfortable flying at night than during the day.

Not being able to be seen so easily, [we were not worried so much about] anti-aircraft fire; it felt a bit 'hot' over the target, and there was always relief when you had finished and opened the engines up and climbed for home.

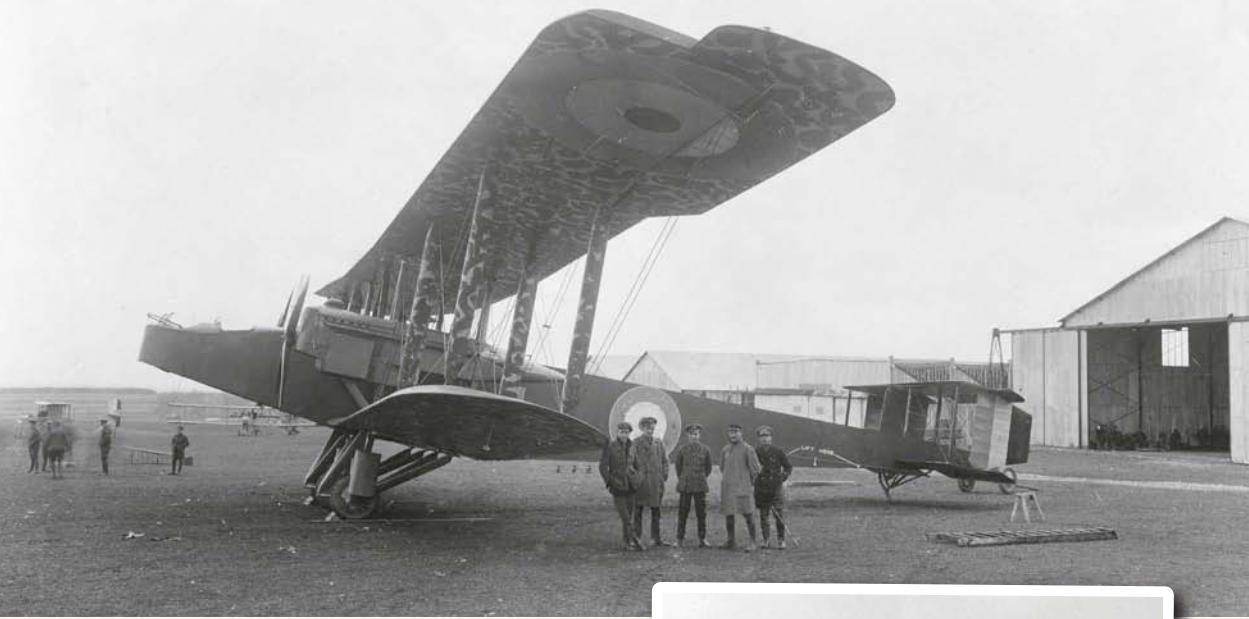
"I always had a feeling we were in a much more comfortable position up there than the poor fellows down in the trenches who we could see getting strafed."

Navigation by night was by compass and map, aided by being near the coast: "Even on a fairly dark night you could see the coast and there were always certain lights, even in the blackout."

The remainder of 1917 was taken up with hostile shipping patrols and night raids on places such as Zeebrugge, Ostend and Ghent, where the targets were usually the docks, railway stations or ammunition dumps. On July 2, for example, Horace took off at 2250hr, recording the following in the logbook: "Raid on Bruges docks; visibility v. good; 14 x 1,200lb [545kg] bombs dropped from 5,000ft [1,500m], all seen to explode in docks". On October 30, 1917, Horace was awarded the Distinguished

PHILIP JARRETT COLLECTION





ABOVE & RIGHT The first O/100 in France, 1459, flew to Paris in October 1916 and joined No 7 Sqn at Coudekerque in April 1917, although it was used for trials with the 6in recoilless Davis Gun over the next few months. Note the mottled camouflage applied to the lower surfaces to improve concealment during moonlight bombing raids. PHILIP JARRETT COLLECTION x 2

Service Cross (DSC) for a similar action on the same target on the night of September 2–3. Gradually missions ranged further afield, with less emphasis on naval targets, including an attempted raid on Cologne in October, which had to be abandoned owing to bad weather.

On January 19, 1918, Horace was promoted Squadron Commander and posted to Ochey, about 70 miles (110km) west of Strasbourg, to take charge of No 16 Sqn RNAS. On April 1, 1918, Horace was given the rank of Major in the newly-formed Royal Air Force, No 16 Sqn becoming No 216 Sqn RAF. He remained with the unit until the end of the war, when he was awarded an OBE for outstanding service with the squadron.

The next big show

On the outbreak of war in 1939, Horace rejoined the RAF and served as a ground controller for Coastal Command. Surviving his second war, Horace lived to the ripe old age of 93, unlike his friend Bettington and so many others.

When I told him proudly that I had just flown solo for the first time, his reaction was a wry smile and a quiet comment:

"Well, of course, all my first flights were solo!"

"So how did you actually learn then?" I asked.

"Well, they showed you how to work the engine and how you steered the thing, and then told you to taxi back and forth over the field."



You soon got the hang of that, so you started to go a bit faster and faster until suddenly you realised the wheels had left the ground.

"That was a wonderful moment when you realised you were actually flying. Then you began to go higher each time until you were about 20ft up and you thought if I go any higher than this, there won't be room to land, so you knew the next time you would have to keep the power on and go right up and do a complete circuit of the field."

Simple really.

WINGS OVER PERU

The Stinsons of Elmer J. "Slim" Faucett

South American aviation historian **AMARU TINCOPA** takes an in-depth look at the series of rugged bush aircraft created in Peru by American expatriate Elmer Faucett, who used his fleet of imported Stinson high-wing monoplanes as a blueprint for the development of a limited line of highly specialised aircraft capable of opening up the nation's harsh interior





IEHAP VIA AUTHOR

PERU; A VAST land of extreme weather comprising a large coastline, deserts, the seemingly untameable Andes and the wild and largely unexplored Amazon forest. During the late 1920s, this impenetrable and troublesome territory was seen as a land of opportunity for aerial transport operators. By 1927 several small ventures were operating commercial air services in Peru. One had been set up by the Curtiss Aircraft commercial mission in the early 1920s, providing mail, cargo and passenger transport services throughout the Peruvian coastal region. Another, *Línea Aérea de Montaña* (Mountain Air Lines), was established by the *Marina de Guerra del Perú* (Peruvian Navy) in 1927, and provided cargo, mail and passenger services between the coastal and eastern regions of the country.

These two services proved insufficient to cover growing demand, however, and it became increasingly clear that the country would become a battleground for foreign companies looking to satisfy that demand. It was at this point that a young American, Elmer James Faucett, entered the scene to become a major player in Peruvian aviation for the next 50 years.

Known to his friends as "Slim", Elmer Faucett was born in Savona, New York, on March 15, 1891. Born into a family of farmers, the young Elmer soon developed a strong desire to see

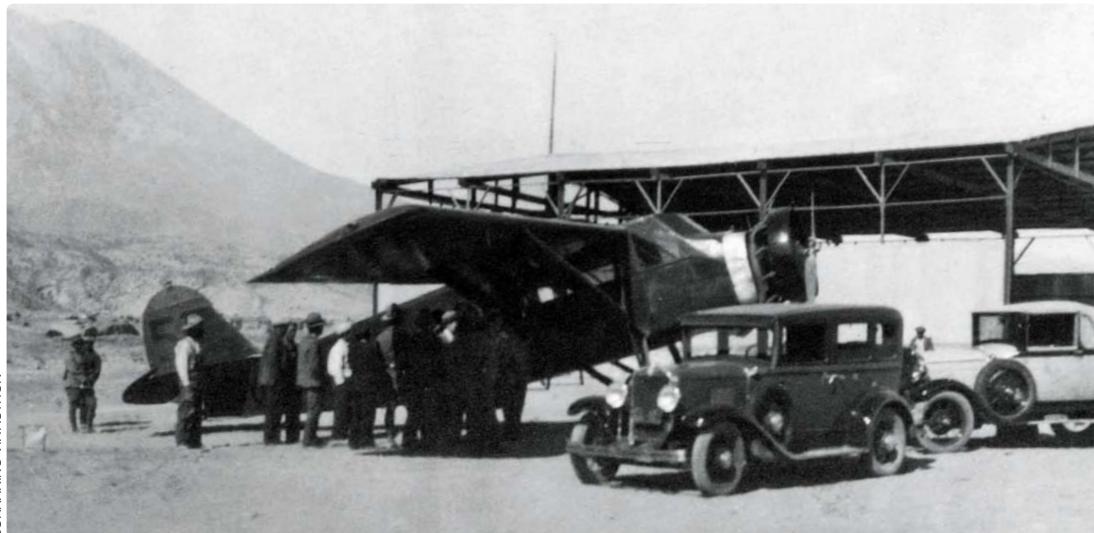
ABOVE A Stinson-Faucett F-19 of the Cuerpo de Aviación del Perú (CAP – Peruvian Aviation Corps) performing invaluable transport service to a remote location on the Pachitea River deep in the Amazon rainforest in 1944. **OPPOSITE PAGE** Peruvian aviation pioneers pose beside a Curtiss Jenny at the Curtiss Civil Aviation School in Lima in 1921. From left: José Romanet; Carlos Martínez de Pinillos, Elmer "Slim" Faucett and Lloyd Moore. AUTHOR'S COLLECTION

the wider world, and in 1915, at the age of 24, Faucett left his home town and moved to Hammondsport, New York, where he obtained a job at the Curtiss Aircraft Co factory.

Trained as an aviation mechanic, Faucett soon developed a passion for aviation and learned to fly under the guidance of famous aviators Jim Ray and Floyd Bennett. In 1916 Faucett joined the US Army and soon found himself serving on the USA-Mexico border under the command of Gen John J. Pershing.

Faucett eventually left the army to join the US Navy, and, thanks to the skills he had obtained during his previous training, returned to aviation when he was appointed to the Curtiss factory at Hammondsport, at the time busy producing aircraft for the American military.

By 1920 Slim was working as a chief mechanic at the Curtiss workshops at Roosevelt Field on Long Island, NY. The young mechanic, however, was unhappy about having to stay on the



ABOVE With the distinctive Misti volcano at Arequipa rising in the background, Stinson SM-6B OA-BBE, company number "5", is loaded in preparation for its next flight. The SM-6B was an enlarged version of the popular SM-1 Detroiter series, capable of carrying eight, although two of the places were often replaced with baggage or cargo.

ground while others took to the skies. His desire to fly led Faucett to "borrow" an aircraft for a ride without permission; it was a rule violation that cost him his job.

The now-unemployed mechanic looked overseas for his future plans. Learning of the establishment of a Curtiss aviation school in Lima, Peru, he decided to try his fortune there and headed for South America, arriving at Callao harbour on June 28, 1920.

Once settled in Peru, Faucett continued to pursue his dream of becoming a pilot and, shortly after his arrival, enrolled in the Curtiss school, which operated from a small civilian airfield at Bellavista, near Callao. On March 1, 1921, Faucett performed his first Peruvian solo flight, and, after obtaining his pilot's licence, was hired by the school to spread the flying gospel to the interior of the country, visiting several towns in the Peruvian coastal and mountain regions. It was during this period that Faucett realised the opportunities Peru offered for a commercial aviation enterprise, and, using all his savings,

he managed to purchase a secondhand Curtiss Oriole from the school. Faucett began making independent flights to towns in the country's interior, with the intention of raising interest and gathering funds from possible investors for a new business — a Peruvian airline service.

Slim's chance

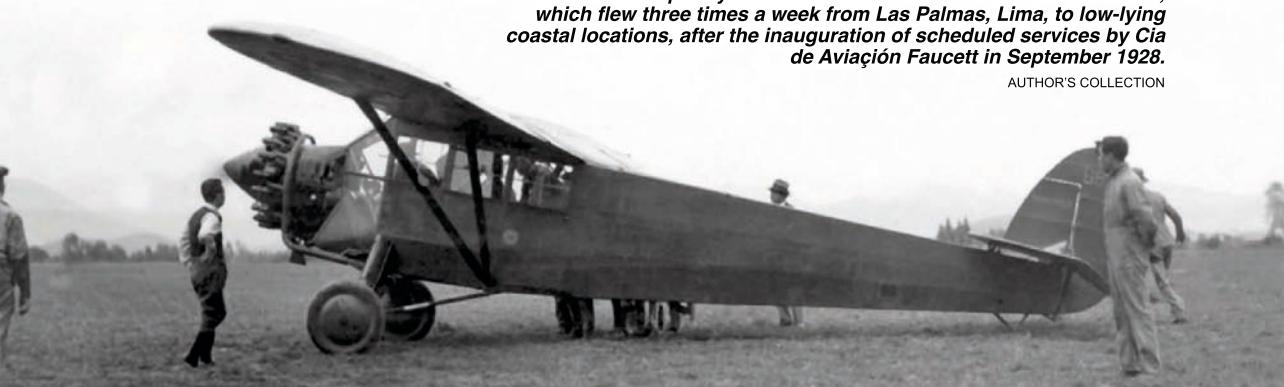
Faucett's efforts proved fruitful and, eventually, he managed to obtain the funds required to start a business from several Peruvian businessmen, including Paul Winder, Armando Fabbri, Ernesto Ayulo, Santiago Acuña, Manuel Gallagher and Juan Pardo. With sufficient capital raised, Slim and his investors established *'Compañía de Aviación Faucett S.A.'* in early 1927.

On June 4, 1928, the Peruvian government issued Supreme Resolution No 736, thereby giving the company authorisation to begin operations within Peru's borders. At the time the company owned two aircraft; the Oriole and a Fairchild FC-2W monoplane.

The company undertook its first official

Faucett's first purely commercial aircraft was this Fairchild FC-2W, which flew three times a week from Las Palmas, Lima, to low-lying coastal locations, after the inauguration of scheduled services by Cia de Aviación Faucett in September 1928.

AUTHOR'S COLLECTION





ABOVE A CAP Stinson SM-1F has its Wright engine run up before departing the primitive airstrip at San Ramón in the central highlands of the westernmost Amazon rainforest region. Beside it is a CAP Travel Air 6000B. The example of the latter sold by Faucett to the CAP, which was subsequently written-off, may also be seen in the background.

commercial operation on September 15, 1928, when Slim Faucett himself took off from Las Palmas, Lima, for Talará, Piura, aboard the Fairchild, carrying mail and four passengers. Early success enabled Faucett to secure additional investment from his associates, which he used to expand the company. In 1929 he purchased a 132,000m² (1.4mft²) block of land in the Miraflores district of Lima, where he began the construction of an airfield with a 700m (2,300ft) landing strip and maintenance and administrative buildings for the company. Faucett also took the opportunity to return to the USA to procure more aircraft for the company.

Back in America Faucett managed to acquire a pair of secondhand Wright J6-powered Stinson SM-1F Detroiter high-wing monoplanes for \$13,500 each. These arrived in Lima in early 1929 and were given the civil registrations OA-BBB and OA-BBC. The pair was soon joined by more machines, and by 1930 the Cia de Aviación Faucett fleet was operating six Stinsons and a single Travel Air 6000B on several routes across Peruvian territory.

While the Detroiter included some advanced features — a soundproofed and heated cabin, for example — and its overall performance was found to be adequate for operations over low-lying coastal areas, the type was decidedly underpowered for flights over the mighty Andes. Moreover, after a few years of service, the effects of the poorly-prepared rough strips from which they had to operate began to take a toll on the Stinsons. Faucett was unsurprised, always having had reservations about the aircraft, finding the type underpowered and too fragile to cope fully with the terrain and operational conditions it faced in Peru. At the

time the Stinsons were all he could get given the company's restricted budget.

At the beginning of the 1930s Cia de Aviación Faucett had six Stinsons in service, identified with the following registrations and individual numbers: the first three were SM-1Fs — OA-BBB (No 2); OA-BBC (No 3) and OA-BBD (No 4) — and the other three were Pratt & Whitney Wasp-powered SM-6Bs — OA-BBE (No 5); OA-BBF (No 6) and OA-BBH (No 8).

The fortunes of war

On September 1, 1932, Peruvian forces seized the town of Leticia in the Amazon basin, causing a diplomatic incident between Bogotá and Lima. Poor negotiations and meddling from obscure interests inflamed the situation, resulting in the outbreak of a full border conflict between Colombia and Peru five days later. The Peruvian military quickly realised that air transport would be vital for the fast, efficient re-supply of its forces on the remote border.

Faucett, always looking to seize good business opportunities, sold his sole Travel Air 6000B to the Peruvian government for US\$7,800. This was followed from March 1 to April 6, 1933, with the lease of one of the company's Stinsons, which was employed by the *Cuerpo de Aviación del Perú* (Peruvian Aviation Corps — CAP) on transport duties between Las Palmas, the CAP's main air base at Lima, and San Ramón, a secondary airfield on the edge of the Amazon rainforest.

This first contract was followed by another for the lease of five aircraft and crews to serve on CAP transport duties between April 22 and June 15, 1933. These aircraft were fitted with "bush" wheels in order to operate from the primitive airfields of the Peruvian mountain region.



ABOVE A pilot's-eye view of Santa Cruz Airfield, built by Faucett and opened in the Miraflores district in southern Lima in 1930, and which served as the company's main operations hub until 1948, when Faucett moved to the international airport at Limatambo. Its short runway was unsuitable for larger aircraft, so Santa Cruz was closed.

Faucett was able to negotiate favourable terms from the Peruvian government because of the urgency of the situation. The resulting upturn in the company's fortunes enabled the American pioneer to consider seriously an idea that had been forged in the early 1930s — the construction of aircraft in Peru.

A new venture

By 1933 the Faucett company was in need of a larger, stronger aircraft that was easy to build and maintain. In mid-1934 Slim managed to obtain the licence rights to build the Stinson SM-6B locally, with the company's engineers incorporating a number of modifications to the original design in order to meet the company's requirements.

The first "Peruvian-built" Stinson was in fact the company's fourth SM-6B, acquired in May 1934. The aircraft was sent to the company workshops at Santa Cruz airfield, Miraflores, where it was substantially modified. The "new"

airframe, given the registration OA-BBI and the individual company number No 9, was rolled out from the Faucett workshops in early September 1934, making its first flight on the 20th in the hands of the company's chief test pilot, Gale Alexander, with Faucett as copilot.

This modified SM-6B became the prototype of the first of the Stinson-Faucett aircraft, designated as the F-10, featuring a deepened and widened fuselage and increased wingspan. These modifications allowed seven passengers or a 550kg (1,215lb) load to be carried. The new variant incorporated a much more powerful 600 h.p. Pratt & Whitney S1H1-G Wasp radial engine in place of the original 420 h.p. Pratt & Whitney R-1340 Wasp C, as well as a new strengthened undercarriage fitted with "bush" tyres. The prototype also featured an angled-forward windscreen, similar to that of the Vultee V-1A and Boeing 247, although subsequent production F-10s featured a more conventional glazing frame layout.

CURRARINO VIA AUTHOR





ABOVE The eighth production Stinson-Faucett F-10, OA-BBQ/No 17, flies over the San Isidro district of Lima in the hands of Lt-Col Armando Revoredo Iglesias on his return to the Peruvian capital after his record-setting flight from Lima to Santiago in Chile, Buenos Aires in Argentina, Montevideo in Uruguay and back to Lima in early 1937.

The Faucett works at Santa Cruz began production of the F-10 in mid-1935, continuing until 1939, when the type was replaced by the upgraded F-19. In total, 12 F-10s were delivered to the company (see panel at right). One was used by Lt-Col Armando Revoredo Iglesias on his celebrated long-distance flight from Lima to Buenos Aires in Argentina.

Setting off in OA-BBQ/No 17 at 0022hr on March 29, 1937, Revoredo Iglesias flew to Santiago in Chile, where he landed and refuelled before heading east, arriving at El Palomar airport nearly 13hr and 3,300km (2,050 miles) later. The pilot had already established himself as an experienced aviator, having flown a CAP Travel Air 6000B from Lima to Bogotá in 1935.

After attending numerous ceremonies held in his honour by the Argentinian government in Buenos Aires, Revoredo Iglesias took the opportunity to fly on to Montevideo, Uruguay's capital, on April 15, before returning to Lima, where he arrived two days later, landing at

STINSON-FAUCETT F-10 PRODUCTION

A TOTAL OF 12 Stinson-Faucett F-10s was built, all at Santa Cruz. The list below details their civil registrations, fin numbers and construction numbers (c/ns):

OA-BBI (No 9) — modified Stinson SM-6B;
OA-BBJ (No 10) c/n 1; **OA-BBK** (No 11) c/n 2;
OA-BBL (No 12) c/n 3; **OA-BBM** (No 13) c/n 4;
OA-BBN (No 14) c/n 5; **OA-BBO** (No 15) c/n 6;
OA-BBP (No 16) c/n 7; **OA-BBQ** (No 17) c/n 8;
OA-BBR (No 18) c/n 9; **OA-BBS** (No 19) c/n 10;
OA-BBT (No 20) c/n 11

BELOW An interesting collection of military and civil aircraft at Piura airfield in north-western Peru in early 1931. From left to right: a pair of Stearman C3Rs operated by the CAP's Escuadrilla de Transporte (Transport Flight); Faucett's Stinson SM-6B OA-BBE/No 5; Travel Air 6000B OA-BBG/No 7, also operated by Faucett, and an unregistered civil Travel Air 2000.





ABOVE Armando Revoredo Iglesias (seventh from right in white peaked cap) and his wife pose beside OA-BBQ/No 17 with a welcoming committee of Peruvian and Argentinian officers at El Palomar airfield after the F-10's arrival in Buenos Aires in March 1937.

LEFT The cabin of the eight-seat Stinson-Faucett F-10/F-19. The structure of both was of mixed construction, with wooden wings and welded steel-tube fuselage and tail unit, the whole being covered with fabric. Faucett's aim to create a rugged yet comfortable bush aircraft was entirely successful and paid dividends for the company.

BETWEEN Passengers await the loading of their luggage aboard F-10 OA-BBT/No 20 at Santa Cruz in 1942. By 1945 the privately-owned airfield had modern hangars, workshops, radio equipment and a car service that ran passengers to their destinations in Lima.



Another interesting line-up, this time at San Ramón in July 1942. Nearest the camera is a CAP F-19, serial 24-1-4, with engine running. Next in line is a US Marine Corps Grumman J2F Duck, beyond which is a Barkley-Grow T8P-1 of the CAP's No 29 Escuadrón Comando. At the furthest end are a Beech C-45 of the Mision Americana de Aviación (American Aviation Mission) and F-19 OA-BBW/No 23.

PERUVIAN AIR FORCE VIA AUTHOR



RIGHT This close-up highlights the sturdy undercarriage and low-pressure tyres fitted to the F-19, as well as the hold in the fuselage, the door panels of which are seen open, the forward hold having a capacity of 250lb (115kg), the rear being capable of holding 200lb (92kg) of luggage and/or mail.

Limatambo airport to rapturous crowds.

On the morning of September 15, 1937, during a flight to Arequipa, OB-BBR/No 18 crashed into a hill near Atocongo, east of Las Palmas, after running into low mist shortly after take-off, killing all aboard. A second F-10 was lost when OB-BBJ, the first production example, met the same fate on a hill near Punta Chao, in Ancash, on September 18, 1944. Bad weather was again the chief culprit for this accident, which took place about 250 miles (400km) north of Lima while the aircraft was on a scheduled service from Lima to Chiclayo. Five passengers and the pilot were killed in the crash.

The last F-10 loss took place on June 24, 1945, when OB-BBP/No 16 crashed near the town of Motupe, 620 miles (1000km) north-east of Lima, owing to pilot error. There were no survivors among the three crew members.

The F-19

The next variant introduced by the company was the F-19, which incorporated modifications inspired by operational experience and new requirements. The F-10's fuselage was extended and the span increased; and, in order to improve longitudinal stability, a larger tail section was designed and introduced.

Two versions of the F-19 were produced: a conventional landplane with a wheeled undercarriage, powered by a 600 h.p. Pratt & Whitney Wasp S1H1-G; and a floatplane version fitted with the more powerful 875 h.p. Pratt & Whitney



AUTHOR'S COLLECTION

Hornet and equipped with large Edo floats.

The CAP operated a total of six F-19s, three of landplane configuration and three floatplanes; the landplanes were assigned to No 24 Escuadrón de Transporte (ET), based at Teniente Torres airbase in Limatambo, and the floatplanes operated with No 54 ET, based at Teniente Cornejo airbase at Iquitos, for operations in the Amazon forest rivers.

Production of the Stinson-Faucett F-10 and F-19 reached 36 aircraft over ten years of continuous production, with the last machine, an F-19 for the CAP, rolling out of the factory in late 1946. The Stinson-Faucetts enjoyed a long operational life with both Faucett and the CAP. Despite the arrival in country of more modern aircraft such as the Douglas DC-3, it was the F-19's ability to operate from small unprepared fields in the Andes and on the rivers of the Amazon which gave it an almost mythical reputation among Peruvian airmen. It was not unusual to see the type's vintage silhouette at Peruvian small-town airfields well into the 1960s.



DAN SHUMAKER VIA AUTHOR

ABOVE The 27th Stinson-Faucett built, F-19 OB-R-143, was photographed in a hangar at Limatambo in the late 1960s, when the type was still very much in service. Peru's civil registration system was originally prefixed with OA- until around 1940, when it was changed to OB-; in 1964 it then became OB-R- followed by three numbers.

The first F-19 loss was recorded on September 8, 1941, when a CAP Stinson of No 24 ET made a forced landing owing to engine failure during a flight from Chiclayo to Lima. Fortunately there were no injuries. An F-19 identified as OB-PAF-133, flown by CAP Capt Rafael Leon de la Fuente — a veteran of the 1941 conflict between Peru and Ecuador — was lost on September 10, 1945, along with all its passengers after it crashed into a mountain in bad weather near the town of Pinra, Huanuco. Another tragic incident took place a short time later, on October 24, when F-19 OB-PAG-139 crashed near Tarapoto shortly after take-off, killing all five occupants.

After the disbandment of No 24 ET in mid-1945, all remaining F-19s were fitted with floats and assigned to *Transportes Aereos Militares* (Military Air Transport — TAM), a military-owned company which provided air transport

services for the hundreds of towns and villages spread along the Amazon forest.

In 1954, in deteriorating health, Slim Faucett retired from the company. On April 10, 1960, some 40 years after arriving in Peru, he died in Lima, after a long battle with cancer. At the time of his death, Cia de Aviación Faucett was operating a fleet of eight DC-3s, four DC-4s, four F-19s and a single DC-6, representative of the growth of the company from its humble origins.

By 1974 most of the Stinson-Faucetts had been grounded owing to their advanced age, but at least two were kept in operational condition; one was owned by the Faucett company and the other by the CAP. Fortunately, several F-19 airframes have survived and have been preserved as a tribute to the American visionary who was determined to prove that aviation was a vital tool for the economic development of Peru.



A peaceful image of an unidentified float-equipped F-19 at the seaplane base at Ancón in northern Lima Province, where it underwent testing after its delivery to the CAP in 1943. The floatplane version was fitted with the more powerful Pratt & Whitney Hornet nine-cylinder air-cooled radial engine, in contrast to the landplane's P&W Wasp.

CURRARINO VIA AUTHOR



Stinson & Stinson-Faucett aircraft data

	Stinson SM-1F	Stinson-Faucett F-10	Stinson-Faucett F-19
Powerplant	1 x 300 h.p. Wright J6 Whirlwind radial engine	1 x 600 h.p. Pratt & Whitney S1H1-G Wasp radial engine	1 x 600 h.p. Pratt & Whitney S1H1-G Wasp radial engine*
Crew	1	2	2
Load	6 x passengers or 1,100lb (500kg) cargo	7 x passengers or 1,100lb (500kg) cargo	7 x passengers plus 650lb (295kg) load or 1,540lb (700kg) cargo
Dimensions			
Span	46ft 8in (14·22m)	52ft 8in (15·94m)	58ft (17·7m)
Length	32ft 0in (9·75m)	34ft 4in (10·45m)	38ft 8in (11·79m)
Height	8ft 3in (2·51m)	14ft 3 $\frac{1}{4}$ in (4·35m)	14ft 4in (4·37m)
Wing area	—	—	436ft ² (40·5m ²)
Weights			
Empty	—	5,688lb (2,580kg)	5,775lb (2,622kg)* 5,688lb (2,580kg)**
Loaded	—	—	8,750lb (3,972kg)* 9,056lb (4,108kg)**
Maximum take-off	3,485lb (1,580kg)	9,060lb (4,110kg)	9,056lb (4,108kg)**
Wing loading	—	—	21·8lb/ft ² (106·4kg/m ²)* 22·5lb/ft ² (109·8kg/m ²)**
Power loading	—	—	14·6lb/h.p. (6·6kg/h.p.)* 10·3lb/h.p. (4·7kg/h.p.)**
Performance			
Max speed	132 m.p.h. (212km/h)	180 m.p.h. (290km/h)	180 m.p.h. (290km/h)**
Cruise speed	—	—	140 m.p.h. (224km/h)**
Landing speed (without flaps)	—	—	70 m.p.h. (113km/h)
Service ceiling	14,000ft (4,270m)	22,000ft (6,700m)	22,000ft (6,700m)**

* Floatplane fitted with 1 x 875 h.p. Pratt & Whitney R-1690-52 (S1E3-G) Hornet radial engine

** Landplane variant

Stinson-Faucett F-19 OB-R-147 has been preserved and restored in the vivid markings of the F-10 flown by Armando Revoredo Iglesias during his 1937 South American record-setting flight, and put on display at Jorge Chavez International Airport at Callao, west of Lima. Curiously, it appears that the team responsible for the aircraft's latest restoration has mistaken the last letter of the original's OA-BBQ registration for an "O", although the number, 17, is correct.





Defending the Reich

Part 1: Rockets, stovepipes and the “Crab Device”

Luftwaffe specialist ROBERT FORSYTH opens a three-part series on the research and development work undertaken by specialist unit Erprobungskommando 25, formed in April 1943 specifically to devise and test potential — and often bizarre — solutions to the overwhelming problem of the USAAF's increasingly effective daylight bombing campaign



TN THE SPRING of 1943, with Germany's population, industry and transport network suffering under the Allies' steadily intensifying strategic bombing offensive, the Luftwaffe found itself under mounting pressure to respond and counter the growing threat. As one part of its response, a small unit, tucked away at Wittmundhafen airfield in northwest Germany, close to the North Sea coast, was formed specifically to devise inventive and radical solutions to the escalating problem of the USAAF's four-engined heavy bombers, which were attacking the Reich in daylight in ever-increasing numbers.

Erprobungskommando 25 (Test Command 25) was formed on April 17, 1943, under the command of Major Heinz Nacke, a very experienced airman and previously the *Kommandeur* of nightfighter unit III./NJG 3. A veteran of the Spanish Civil War, Nacke had been awarded the Knight's Cross in November 1940 for his 12th aerial victory while flying Messerschmitt Bf 110 Zerstörers with 6./ZG 76. His tenure in command of E.Kdo 25 was brief, however, and he was replaced, on a temporary basis, within a matter of weeks by an equally experienced Zerstörer pilot, Hauptmann Eduard Tratt, erstwhile *Staffelkapitän* of 1./ZG 1 in the East. Tratt was also a recipient of the Knight's Cross, having been decorated in April 1942 for his 20th aerial victory.

Following his arrival at Wittmundhafen, Tratt set about arranging the establishment of three *Staffeln* for the embryonic *Kommando*. First, a *Jagdstaffel* (fighter squadron) was formed under Leutnant Wilhelm Sbresny and equipped with three Messerschmitt Bf 109Gs and seven Focke-Wulf Fw 190s, intended to conduct trials with numerous weapons, including rearward-firing armament, periscopes, acoustic fuzes and wing-mounted RZ 65 rockets, originally intended for use by Bf 109s in the ground-attack role against locomotives on the Eastern Front.

Secondly, a *Zerstörerstaffel* (bomber-destroyer squadron) of twin-engined heavy fighters was set up under Ltn Vossel, equipped with around ten Bf 110s, a single Messerschmitt Me 210 and a pair of Me 410s, intended to trial heavy-calibre armament such as the 37mm Flak 18 and Flak 43 and 50mm Flak 41 anti-aircraft cannon. These weapons were tested in a variety of hand-fed, belt-fed and automatic configurations. Generally, however, the results were not encouraging and the eventual operational losses suffered by aircraft fitted with such armament were disproportionately high in the relatively few missions flown, with their



ABOVE Hauptmann Eduard Tratt (left), clad in a "souvenir" British Irvin flying jacket, during his tenure as Kommandeur of II/ZG 26. Credited with 38 aerial victories, Tratt was the highest-scoring Luftwaffe Zerstörer pilot. This photo was possibly taken on February 22, 1944, the day he was killed in action.

envisioned capability nullified by a loss of aircraft speed and the defensive fire of enemy bombers.

Finally, a *Kampfstaffel* (bomber squadron) was formed, equipped with two Dornier Do 217s, three Junkers Ju 88s, a solitary Heinkel He 177 and four Bf 109Gs for escort purposes. This Staffel was intended to assess air-burst bombs, towed bombs, the radio-guided Henschel Hs 293 glider-bomb, underwing mortars and rockets, as well as conduct experiments in air-to-air bombing.

Like Nacke, Tratt would remain in command at Wittmundhafen for only a short time, until his permanent replacement arrived in the form of *Oberleutnant* (soon promoted Hauptmann) Horst Geyer, a fighter pilot who, in early 1940, had been assigned as adjutant to the *Generalluftzeugmeister*, Ernst Udet, before joining II./JG 51, with which he was credited with 18 victories. Geyer's service on the Eastern Front came to an end when, in November 1941, he returned to Germany to attend Udet's funeral and was promptly transferred to the staff of the new *General der Jagdflieger* (Commanding General of Fighter Forces), *Oberst*

OPPOSITE PAGE, BOTTOM Young Luftwaffe fighter pilots watch and listen carefully as an experienced NCO pilot uses a model of a Messerschmitt Bf 109 to demonstrate tactics to be deployed against an American B-24 bomber in Sicily in 1943. The model is fitted with wire frames to represent the cones of fire from a B-24's defensive guns.



ABOVE Hauptmann Horst Geyer took over from Eduard Tratt as commander of Erprobungskommando 25 in the late summer of 1943. Like his predecessor, he seems to wear an enemy flying jacket as a mark of office, this time a USAAF garment. He is seen here at Achmer in early 1944 beside one of the Kommando's Messerschmitt Me 410s.

Adolf Galland. In May 1943 Galland ordered Geyer to relocate to Wittmundhafen and take over command of E.Kdo 25 from Tratt, who was returning to I./ZG 1.

Rocketeering

Geyer quickly rose to the challenge of his new command and one of his first initiatives was to investigate the use of wing-mounted rockets and mortars by single-engined fighters against enemy four-engined bombers, or *Viermots* ("four-motors") as they were referred to colloquially by the Luftwaffe. As a first trial, two Fw 190s were each fitted with a pair of external wing-mounted "firing frames", each built to carry four 65mm spin-stabilised RZ 65 rockets.

Designed by Rheinmetall-Borsig at its factory at Unterlüß, between Hannover and Lüneburg, the RZ 65 was intended to be launched from an externally mounted rack or from a Föhn "honeycomb" barrel of tubes. Originally loaded with a "compressed black powder" as a propellant, this was later replaced by a more efficient smokeless powder and activated by an electric threaded primer. Weighing 3.15kg (7lb), including a warhead of 840g (1.85lb), the rocket had a nominal velocity of 300–380m/sec (985–1,245ft/sec) and was fuzed with an electric and mechanical percussion fuze. It was to be fired at a maximum range of 300m (1,000ft) from a target and, once launched, would spin at 19,700 r.p.m. with a maximum thrust of 200–220kg (440–485lb).

The RZ 65 is thought to have first seen operational deployment with E.Kdo 25 when

two Fw 190s took off as part of a four-aircraft *Schwarm* to intercept raids by the US Eighth Air Force against Bremen and Kiel — targets close to Wittmundhafen — on June 13, 1943. Geyer led one of the two-aircraft *Rotte*, each machine carrying RZ 65s, while the other Rotte was led by Oberleutnant Erwin Hardtke, who had joined E.Kdo 25 from Schl.G. 1. Geyer recalled:

"This mission would see my first *Abschuss* [victory] as *Kommandoführer* of Erprobungskommando 25. Scattered bomber units were making their way home after their raid on the ports. There were no escort fighters in sight, so I attacked two [Boeing] B-17s which were flying close together. I fired all eight RZ 65s and after the two bombers were forced to separate, I was able to wreak havoc on the machine flying lowest and to the right with several bursts from my MK 108 cannon."

"From about 2,000m [6,500ft], I observed two parachutes fall out while the B-17 was evidently trying to go for an emergency landing. Meanwhile I had lost contact with my three comrades, but they all landed back at Wittmundhafen without damage. What was key here was that the rockets had weakened the bombers' defensive fire, shocked the crews and enabled me to get in close to make my shoot-down."

In a later modification, the wing leading edges of at least one of the Kommando's Fw 190s had launch tubes for six RZ 65s installed internally, with three tubes built into each wing, but this brought little result.

Despite isolated successes, deployment of the



This Focke-Wulf Fw 190A-5 of E.Kdo 25 has been fitted with six tubes, probably for spin-stabilised RZ 65 rockets, built into its wings. The concept proved disappointing in limited operational trials during the summer of 1943, and was dropped from the Luftwaffe inventory later the same year.

RIGHT A close-up of the three rocket tubes for spin-stabilised RZ 65s fitted within the starboard wing of one of the Kommando's Focke-Wulf Fw 190A-5s.

RZ 65 by E.Kdo 25 proved largely unsatisfactory owing to technical problems. A week after Geyer's attack on the bombers he reported that "the use of the RZ 65 has shown that impact on a target at a key point cannot be seen. The calibre [of the rocket] is too small when compared to the size of a four-engined bomber. In addition to the extraordinary stability of these aircraft, it has recently been discovered that crews (or at least the pilots) are provided with chain-mail armour in addition to the normal armour plating. This provides excellent protection against small shell splinters. Even when fired in mass, there is little chance of success owing to the poor ballistics".

Indirectly, this was a testament to Geyer's flying skills on June 13, but further trials with the rocket were dropped.

From rockets to mortars

What had been learned by Geyer and his pilots was the value in dispersing the bomber *Pulks* (literally, throngs) so that their defensive fire could be weakened and suitable confusion caused within a formation to enable single, isolated bombers to be targeted more easily. At that point, the fighters could engage more closely and use their cannon and machine-guns to bring the bombers down. What was needed to do this, however, was a more powerful weapon that could cause an even greater breakdown of an enemy formation.

One option lay in the form of an army infantry weapon designed for use in ground warfare — the 21cm (8½in) Nebelwerfer 42 mortar. As



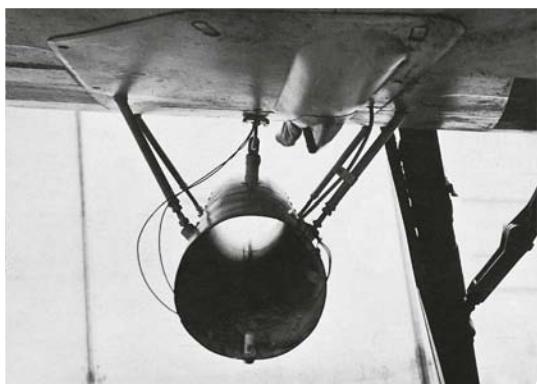
AUTHOR'S COLLECTION x2

hopes fell for the effectiveness of the RZ 65 in June 1943, so a consignment of 30 mortar tubes, together with 200 shells from the Wehrmacht munitions storage facility at Lübeck-Gestringen, was delivered to the Fw 190-equipped I./JG 1 at Schiphol in Amsterdam, with a further 34 tubes and 200 shells going to similarly-equipped II./JG 26 in France, where trials were placed under the supervision of Ltn Otto Hummel of 5.Staffel.

It was at this point that Hptm Tratt, who in the meantime had been appointed to command the Zerstörerstaffel of E.Kdo 25, was assigned temporarily to I./JG 1, where he formed the Erprobungskommando/JG 1, equipped with four Fw 190A-4s, specifically to undertake tests with the mortar. Firing took place over the North Sea, and as early as June 13 three B-17s were claimed by mortars over the German Bight, while on the 22nd, Oberfeldwebels Hans Laun and Günter Fick of I./JG 1 claimed a further two Viermots shot down and two damaged. These initial results proved sufficiently satisfactory for trials to continue using aircraft of both JG 1 and JG 26 as well as E.Kdo 25, and the weapons-testing centre at Tarnewitz.



AUTHOR'S COLLECTION x 2



TOP Focke-Wulf Fw 190A-5 WNr 1372, "White 4", was used extensively for static firing trials, and is seen here with its tail jacked up and a W.Gr.21 mortar attached to the starboard wing. **ABOVE LEFT & RIGHT** The aerial mortar was a relatively simple device that could propel a projectile at a comparatively low velocity over a short range.

Geyer remembered: "Unlike other missiles, the 21cm Werfer, which came to us from the Army, was not equipped with fins or stabilisers. Rather, this weapon was stabilised by its own spin, which, in turn, was created by the blast from initial ignition and the subsequent velocity. The 21cm shell turned two or three times per second after leaving its launch tube, but speed increased rapidly thereafter.

"We observed that the shell did not run straight to its intended target, but rather spiralled, and therefore often missed the target. To overcome this, the manufacturer built in a time fuze intended to detonate the shell at a pre-set time. We usually fired the weapon from a range of 400m [1,300ft] and from our experience with it, we were able to set the fuze correctly, compensating of course for the approach-speed of the target. However, the

closer to the target you were, so the greater the blast and the success of the weapon."

One W.Gr.21 rifled mortar launching tube, measuring 1.3m (4ft 3in) in length, was suspended from beneath each underside wing surface of an Fw 190A-4/R6 by means of four bracing lugs and a central hook with a suspension bracket. Three retaining springs, located near the rear end of the tube, held the 112kg (245lb) shell with its 40kg (88lb) warhead in place and a screw-bolt, also at the rear end of the tube, prevented the shell from sliding out. In an emergency, the launching tube could be jettisoned by activating an electrically-primed explosive charge which severed the central hook.

The mortars were controlled from an armament panel in the cockpit containing two armament switches and a Rev 16B reflector sight. Two

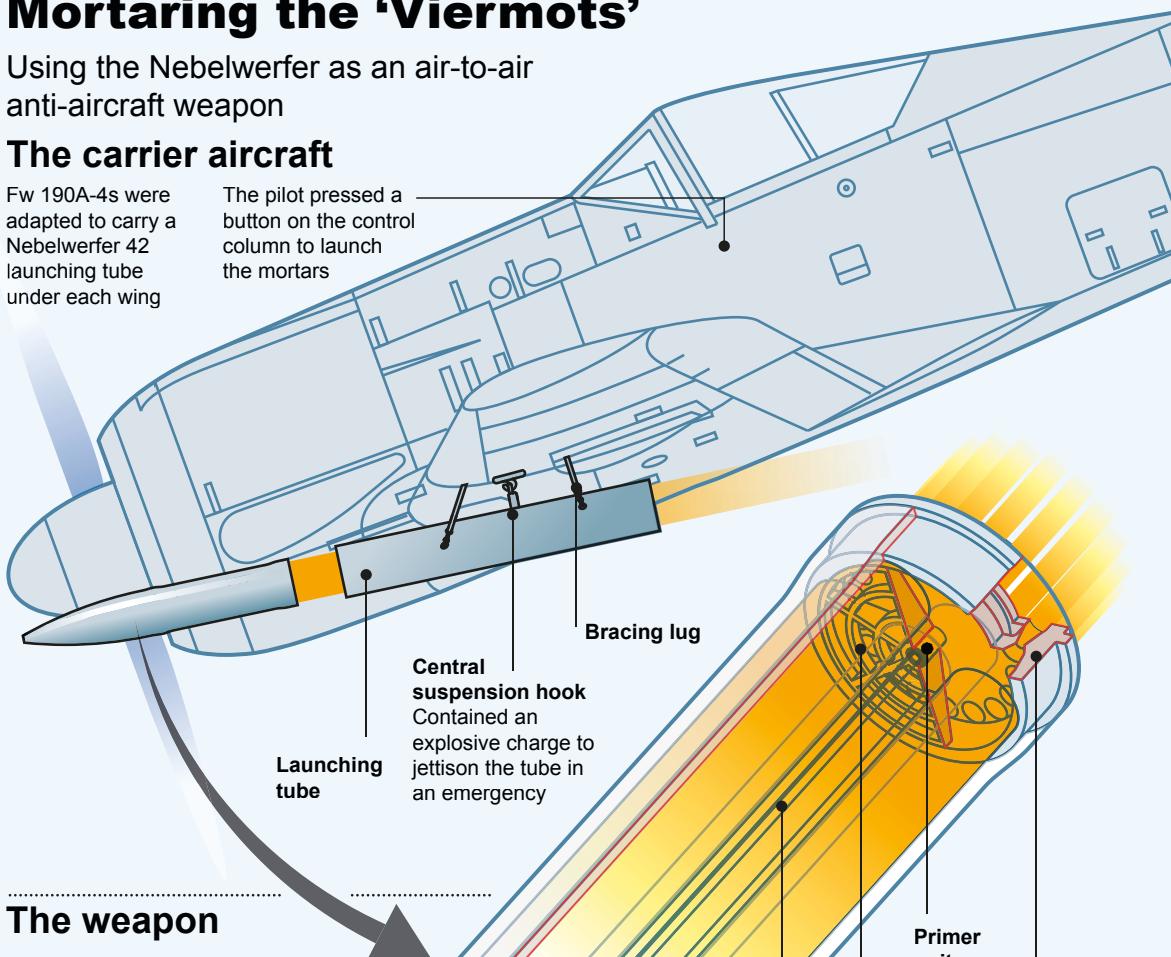
Mortaring the 'Viermots'

Using the Nebelwerfer as an air-to-air anti-aircraft weapon

The carrier aircraft

Fw 190A-4s were adapted to carry a Nebelwerfer 42 launching tube under each wing

The pilot pressed a button on the control column to launch the mortars



The weapon

Time fuze
Detonated the shell after a pre-set interval

Warhead

Primer unit
Grid
Supported the propellant

Celluloid tube
Carried the ignition flash from primer to forward gunpowder pellet

Propellant charge
Seven tubular sticks burned to provide the thrust

Venturi block
18 venturis acted as the exhausts for the propellant. They are inclined at about 12° which rotated and spin-stabilised the rocket, removing the need for fins

Gunpowder pellet
Ignited the charge



ABOVE A pair of Messerschmitt Bf 110G-2s of ZG 76 fitted with twin mortar sets on each wing head off in search of prey. LEFT The damage inflicted on B-17F 42-29997 The Sack of the Eighth Air Force's 379th Bomb Group, by a W.Gr.21 during a raid on Kassel and Oschersleben on July 28, 1943. The blast from the mortar caused the bomber's oxygen bottles to explode, but the Fortress managed to return to the UK safely.

AUTHOR'S COLLECTION x 2

spin-stabilised shells were fired simultaneously when the pilot depressed a button on his control column. As Geyer states, the mortar shells were fitted with a time fuze, pre-set before delivery to an operational unit and not subsequently adjusted. In theory the firing range was therefore fixed and the weapon's low velocity meant that, to be effective, it had to be aimed 60m (200ft) above its target and a shell had to detonate within 28m (90ft) of a bomber.

The *Ofenrohr* (stovepipe), as the Germans came to call it, was used in numbers for the first time operationally on July 28, 1943, during American raids on Kassel and Oschersleben, and results were acceptable in as much as fragmentation from blast did break up the bombers and a number were claimed destroyed as an indirect result. In a report prepared in late August 1943, US Eighth Air Force HQ warned that the mortar appeared "to be the most dangerous single obstacle in the path of our bomber offensive".

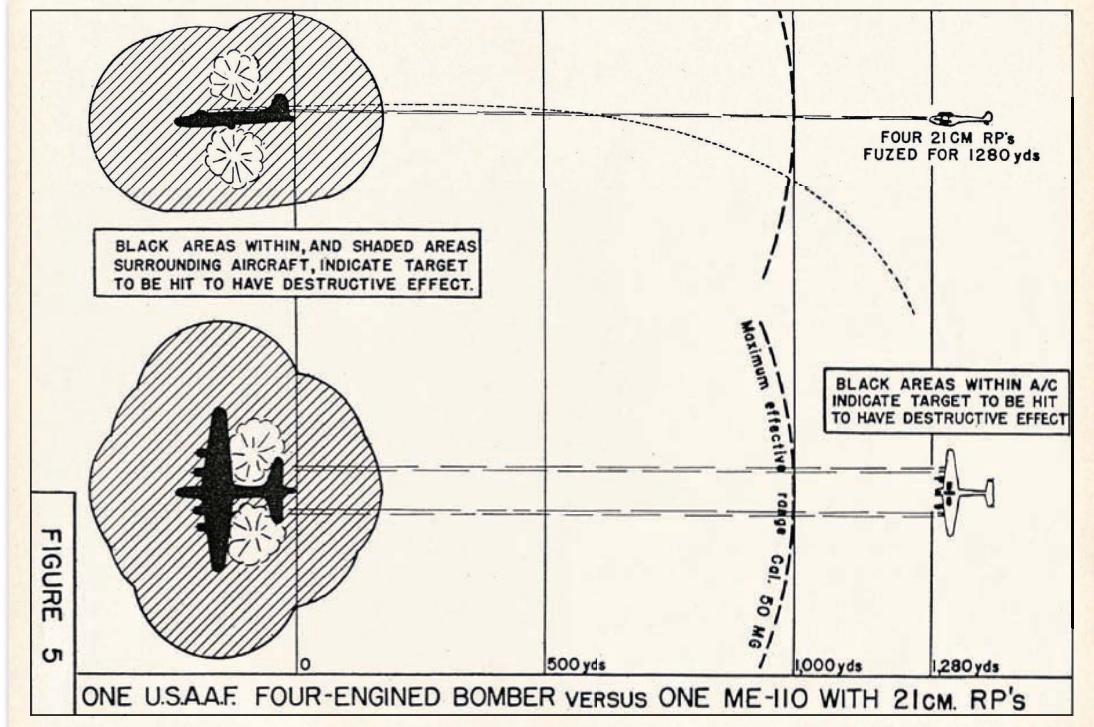
Owing to the limited ground organisation at Wittmundhafen, E.Kdo 25 was relocated 95 miles (150km) south to Achmer in early October 1943. From there, Geyer claimed another victory with the Kommando when he shot down a Consolidated B-24 from a group belonging to the US 2nd Bombardment Division (BD), between Münster and Osnabrück on the 8th.

As the enemy formation made its return from a raid on Vegesack, Geyer took off from Achmer leading a flight of three Fw 190s, each fitted with two W.Gr.21 mortars. Attacking the Liberators from the rear, Geyer fired his mortars at one bomber, but realised only one of his launch tubes was functioning. As he jettisoned both tubes, he noticed that the B-24 had tipped away from its formation and was falling through the sky. Geyer pursued it and opened fire with several long bursts from his 20mm MG 151/20 cannon, following which he observed "considerable damage to the fin assembly and heavy smoke coming from the inner starboard engine. But right then several [North American P-51] Mustangs suddenly rushed down on us and I gave the order to evade. One of my wingmen had also succeeded in shooting down a B-24 using his mortars".

The mortar was perhaps used to its greatest effect against the infamous American mission to Schweinfurt on October 14, 1943, during which 62 Viermots were shot down, many as a result of being dispersed from their formations by the use of the mortar.

Increasing effectiveness

"Stovepipes" were also fitted to Bf 109G-6s of IV./JG 3, I., II. and III./JG 53, I. and III./JG 77 and I./JG 5 and used to varying effect in the Mediterranean



AUTHOR'S COLLECTION

ABOVE This official USAAF diagram from 1944 shows the required area around a B-17 in which an aerial mortar bomb had to explode in order to have a destructive effect when fired by a Bf 110 carrying four "stovepipes" at a range of 1,280yd. Note how the attacker could fire while remaining outside the range of the bomber's rear guns.

and Rumania from August 1943 until early 1944. Other Bf 109s of 7./JG 3, 5./JG 11, 2./JG 27 and 6./JG 51, similarly equipped, operated in the defence of the Reich. A number of Bf 110G-2/R-3s of ZG 76 and Me 410As of ZG 26 carried pairs of twin mortar sets, specially assembled by the *Maschinenfabrik* in Donauwörth, in addition to an array of cannon and machine-guns, to operate as heavily-armed bomber-destroyers.

On October 10, 1943, Maj Karl Boehm-Tettelbach led the Bf 110s of ZG 76, together with Me 410s of III./ZG 1, against B-17s of the 3rd BD during an attack on the marshalling yards at Münster. The Division left England without escort owing to bad weather and had already been mauled by single-engined fighters, but the 14th Combat Bombardment Wing (Heavy) was particularly badly hit near Münster when the mortar-armed Zerstörer undertook a mass attack from the rear, inflicting considerable damage. As the American post-mission synopsis recorded:

"The fighters appeared to stay out of range, Me-110s [sic] firing at formation with long-range weapons slung under each wing and lobbing explosive . . . attacked from 800-1,000yd firing rockets from under each wing (two distinct puffs were seen from each ship). Their formation resembled our defensive formation."

Furthermore, Bf 110s were seen to "hit a B-17 by

rocket, tail came off, 'plane broke in two. It then collided with another B-17 near Saerbeck. Both went down. No 'chutes'".

Nine Zerstörer were lost during the Münster raid, but this was exceptional; losses usually ran at five to ten per cent per mission and success levels were considered good, not just if bombers were shot down, but also where formations were scattered and disorganised, leaving them prey to the single-engined fighter units.

Although further intensive trials continued under E.Kdo 25 until mid-1944, with the aim of improving the W.Gr.21 in terms of strength, weight, functioning and operational longevity, it was found that the launch tubes robbed German fighters — particularly the heavier Bf 110 — of their performance and made them vulnerable to Allied fighters. Senior Luftwaffe fighter commanders recognised the psychological effect of the mortars on enemy bomber crews, but equally that when fitted to the Fw 190, a loss in speed of some 40–50km/h (25–30 m.p.h.) was incurred, as well as a loss of ceiling and manoeuvrability. There was also a lack of a range-measuring device and therefore an inability to control the point of detonation.

Over the Italian front on January 30, 1944, the Staffelkapitän of 2./JG 77, Hptm Armin Köhler, flying a Bf 109, recorded how, on one mission



TOP A dramatic photo capturing the moment a mortar is launched from "White 4" during a static test at Barth in early 1944. **ABOVE LEFT** The results — "White 4" suffered major blast damage to the trailing edge of its wing and control surfaces, although it was repaired and used again. **ABOVE RIGHT** A close-up of a "twin-stovepipe" fitted to an Me 410. The primary objective was to break up bomber formations rather than destroy individual aircraft.

against American bombers over Udine, "I take hits in the starboard wing and the [W.Gr.21] tube is shot away". The next day, when the Allied bombers returned, Köhler complained that "the mortars overshoot".

The "Parthian shot"

Meanwhile, back in the Reich, Horst Geyer was overseeing another development for the W.Gr.21 — a rearward-firing version. In February 1944, following a suggestion made by *Stabsingenieur* Reyle of the RLM's Technical Office, Geyer noted that initial ground tests with a rearward-firing mortar had yielded "positive results", although further — presumably airborne — tests still had to be undertaken. "This installation is ready to go," he recorded, "and it is expected that with little effort, the W.Gr.21 used this way will be much more advantageous compared to the previous attack methods used."

The intention was that a pilot would fire the mortar, known as the *Krebsgerät* (Crab Device), after he had made a firing pass using forward armament against a bomber formation and was in the process of passing through the enemy Pulk. The fuze would be set to detonate at 1½–2sec after the weapon was fired, giving sufficient time for the carrying fighter to fly ahead and clear. There was a plan to make the tube jettisonable after firing but it is not thought this was ever followed through with. It was hoped that a rearward-firing mortar would achieve surprise in the manner of a "Parthian shot", a military tactic made famous by ancient Iranian Parthian archers, who, while retreating on horseback at full gallop would turn their bodies back to shoot at the pursuing enemy.

In May 1944 Galland ordered that 20 Fw 190A-8s be fitted with the *Krebsgerät*, while Obst Hannes Trautloft, Inspector of Day Fighters, required one Me 410 to be installed with the rearward-firing



AUTHOR'S COLLECTION

LEFT Willi Unger of 12./JG 3, based at Barth in May 1944, poses with his Fw 190A-8/R-2, "Yellow 17", which has been fitted with a single rearward-firing 21cm mortar, or Krebsgerät, for use against enemy bombers. Unger was unimpressed with the device and complained that it robbed his fighter of speed and agility.

BELOW In early February 1945 the Me 262-equipped Stabsstaffel of JG 7 undertook trials using W.Gr.21 mortars and later 55mm R4M rockets. Here a pair of Me 262A-1as are seen at Brandenburg-Briest or Parchim fitted with mortar tubes.

mortar for trials with the Zerstörerstaffel of E.Kdo 25. On the one occasion the weapon was fired, the Me 410 suffered from a strong blowback, thick smoke filled its cockpit and its hydraulic system was severely damaged. Despite this, by July 15, 1944, it was planned to have 60 Krebsgeräte ready for installation into Fw 190s, with 16 fighters of E.Kdo 25 fully fitted out by August 15. A new automatic optically-controlled firing mechanism, known as the *Wurzen*, was also being worked on by the HASAG company in Leipzig. By the end of August, however, Geyer recorded that only one Fw 190 had been fitted with the automatic device.

In the meantime, in May 1944, pilots of the Fw 190-equipped 12./JG 3, while based briefly at Barth, had attempted trials with a single rearward-firing 21cm mortar tube. Just four of the Staffel's aircraft were installed with Krebsgeräte fitted beneath their centre sections, but they proved unreliable mechanically. The additional armour already installed in the unit's Fw 190A-8 *Sturmjäger* affected performance, and at least one pilot who tested the weapon in combat, Unteroffizier Willi Unger, reported that the

Krebsgerät simply caused a further deterioration in the fighter's speed and manoeuvrability. By late September, trials with both E.Kdo 25 and other operational units seem to have petered out.

By late 1944 the W.Gr.21 had all but disappeared from Luftwaffe use, although in March 1945 a small number of Messerschmitt Me 262A-1a twin-engined jet fighters of the *Stabsstaffel* and III./JG 7 were fitted with mortars in a brief — and ultimately fruitless — experiment.

Throughout this period, as increasing tonnages of Allied bombs rained down on the German homeland, Horst Geyer had many other weapons projects to attend to; and if conventional weapons were proving insufficient to deal with the bombers, then he was ready to look at other much more ambitious ideas ... 

Next time: E.Kdo 25 continues to investigate ever more desperate — and increasingly bizarre — concepts to turn back the overwhelming tide of Allied bombers, including artificial air squalls generated by explosives, "fire clouds" dropped from above and sharpened steel cables dragged into enemy bomber formations.

EN ARCHIVE VIA AUTHOR



SWING-WING LONDON?

The F-111, the RAF and a naming nightmare

Using contemporary documents Cold War aviation specialist CHRIS GIBSON traces the knotty path of negotiations undertaken during 1966–67 by British and Australian officials in the search for a suitably dramatic name for the state-of-the-art fighter-bomber then on order for the air forces of both nations — the variable-geometry General Dynamics F-111

MANY AIRCRAFT carry famous official names, like the Spitfire; some acquire famous nicknames like the de Havilland Mosquito's "Wooden Wonder", and a few remain unnamed throughout their service careers. An example of the latter is the General Dynamics F-111, a type that entered service with the USAF in July 1967 and finally retired from the Royal Australian Air Force (RAAF) in December 2010. Although the USAF's EF-111A electronic warfare variant was officially called Raven, the standard F-111 was never given an official name, despite acquiring a few nicknames, notably "Aardvark" in USAF service and "Pig" or "Triple-One" while operating with the RAAF.

The RAF's F-111K

Aircraft of the RAF have generally had an official name bestowed upon them after consultation among senior officers. The name would always be determined under established guidelines; bombers were named after inland towns, such as Lancaster or Halifax, for example. With a modified F-111A ordered in April 1966 for the RAF as the F-111K, and for the RAAF as the F-111S (later changed to F-111C) the Air Staff began to consider a name for the type. This was a tall order, as the preference was for a name that would be suitable for the USAF, RAF and RAAF. One odd aspect of the F-111 was that despite its "F for fighter" prefix, it was primarily a bomber.

The naming saga began in October 1966 during a lunch at the Australian High Commission, where the Australian Minister for Air, Peter Howson, held discussions with Lord Shackleton, the UK Minister of Defence for the RAF. An informal post-lunch chat on a possible name for the F-111 had, three weeks later, spread to Australia, and the first thoughts on the matter had made their

way back to London. Air Commodore Keith Parsons at the Australian High Commission penned a letter to Lord Shackleton's Private Secretary, Jim Carruthers (also at the lunch), outlining Australian thinking on a name for the F-111. Parsons pointed out that the type would be known as F-111 in official paperwork, but a nickname would no doubt be applied at some point, and it would be better to apply one semi-officially than have the airmen apply their own.

Parsons informed Shackleton that Air Marshal Sir Alister Murdoch, Chief of the Air Staff in Canberra, advised that the Australian Air Board's preference was "Taipan" and Murdoch had kindly appended an explanation for the RAF. The Taipan is a large highly-venomous snake "indigenous to Australia, and, for its size, is the most deadly in the world", and that it could "strike several times". Murdoch also pointed out that the name itself might be of aboriginal origin or derived from the Chinese word for a "big boss" or head of a trading company, and that it "has not been used before for military equipment".

The name "Boomerang" had been mentioned at that lunch meeting, but Murdoch took the view that this was "pretty uninspired", had been used before by the RAAF and was the name of the ES 60 sailplane developed in Australia by Edmund Schneider Ltd. The note by Air Cdre Parsons concludes by inviting "comments and suggestions from the RAF in due course" and appended an RAAF document on the matter.

The latter described how traditional military names like Ferocious, Annihilator or Endeavour "lack bite and inspiration", while aboriginal names were "extremely apt, but are, in general, harsh-sounding and difficult to pronounce". As examples, the document listed 18 possibilities including "Malonga" (Eagle), "Kakurra" (Long Spear) and "Bumerali" (Lightning), but pointed

In this speculative artwork by IAN BOTT, an RAF F-111K shimmers with condensation on the upper surfaces of its wings during a low-level sortie. When the type was cancelled for British service in January 1968, a number of RAF pilots had already got to know the type through a series of familiarisation flights in the USA. For more information on the artist, visit his website at www.ianbottillustration.co.uk. © 2016





TONY BUTLER COLLECTION

ABOVE In December 1962 the US Defense Department placed an order for 18 pre-production F-111As for the USAF, the first of which to fly, 63-9766, is seen here some time after its maiden flight on December 21, 1964. On its second flight, on January 6, 1965, its wings were swept in flight from the minimum 16° to the full aft 72.5° position.

out that "their strangeness might inhibit acceptance overseas". Other more traditional names included Rapier, Sword and Falcon, with the last being seen as "excellent in every way", although it was also the name of a missile to be carried by the F-111 and a "VIP aircraft operated by No 34 Sqn". The latter was the Dassault Falcon 20 executive jet operated by the RAAF during 1967–89.

By November 3, 1966, Jim Carruthers had passed all the information on to the Deputy Chief of the Air Staff (DCAS), Air Marshal Sir Reginald Emson, and advised that the aim was for a common name for the F-111, that the Americans had "no objection to our naming the aircraft" and that there was an "outside possibility they might even take the name themselves". Carruthers explained that choosing a name for an RAF aircraft was not a random activity like pulling names out of a service cap. There were rules — which Lord Shackleton had already outlined to the Australian Minister for Air — and pointed out that the F-111 was not at a stage where an official name could be applied to the RAF's examples. The DCAS's Private Secretary replied on the 8th, advising that "DS9 [should] make the usual soundings and draft a paper for the Air Force Board" but also advised that there was no great hurry for this. (DS9 was the designation for the government department responsible for the "size and shape" of the RAF, and, like all other departmental designations, could be applied to both the department and the individuals within it cleared to sign on the department's behalf.)

On November 17 DS9a, Mr B.A. Rawet, penned a memo stating that the RAAF was still keen on

Taipan but pointed out that one of the RAF's naming conventions was that RAF bombers were named after British or Commonwealth inland towns. Rawet notes that "the selection of a name for the F-111 within these parameters would result in a name unacceptable to the Australians and Americans". Rawet was pragmatic, stating that "it is suggested, therefore, that at this stage no limitation should be placed on the range of names to be suggested for consideration".

CAPITAL PUNISHMENT

The next day Emson advised that "DS9 [is] now touting for names" and that if anyone had any preferences, he would "feed them into the machine". He continued to make a case for his own suggestion by stating that "since we christened the F-111's predecessor with the name of the Australian administrative capital, it might not be inappropriate for the Australians to agree that honours should be evened, and the F-111 called the London". The DCAS expanded on his thinking, describing how London might find favour with the Americans as it was also an inland town in the USA "near Dayton, Ohio — pity the F-111 is not made by McDonnell". Emson's thinking then takes a somewhat odd turn: "Perhaps there is an even more pertinent reason for giving the F-111 this name. What else is London but the 'swing-wing city?'?", referring to the aircraft's variable-geometry wings.

The next senior officer to weigh in was Air Cdre Denis Crowley-Milling, Director of Operational Requirements (RAF) — DOR1 — whose memo of November 24, 1966, strikes a



ABOVE A General Dynamics promotional artist's impression showing a pair of F-111Ks — or possibly Merlin GR.1s — carrying an impressive load of long-range tanks and four pylons of bombs on pivoting underwing racks. The brown and green camouflage scheme, more redolent of the RAF's Battle of Britain era, is entirely spurious.

more sensible tone. The DOR had little time for the RAAF suggestions, remarking that although Taipan was "the best of the bunch . . . we should choose a more immediately recognisable word". Taipan may also "conjure up visions of British colonialism" to the Americans, but if a name related to the Far East was required, "Typhoon" would be appropriate and more acceptable to all three air forces. Crowley-Milling also suggested "Swallow" in tribute to Barnes Wallis, "the real pioneer of the swing-wing", who had designed a variable-geometry aircraft of that name back in the early 1950s. The final suggestion from the DOR was that since the Canberra was in service with all three air forces, "we might take a name common to all three countries, and possibly a suitable town if there is one" and had set his staff the task of finding one.

Amid the speculation and somewhat bizarre suggestions came a memo to DS9 from Gp Capt J.D. Thirlwell, Assistant Director of Ops (Bomber and Reconnaissance), who had evidently spent some time on the matter. Thirlwell considered the adoption of a name "merely to get common agreement" a bad idea, and that of the Australian suggestions only Taipan was "apt" — but was unfamiliar and meant little to non-Australians. Thirlwell also informed DS9 that AOC-in-C Bomber Command Air Chief Marshal Sir Wallace Kyle had suggested "Merlin", as the bird swept its wings as it stooped on its prey. This, however, had been rejected in favour of "many others which are better-sounding and more appropriate".

Thirlwell advised that the name considered "most suitable by far" by Ops (B&R) was "Fire-

bolt", which had not been used before and had "strength and punch, and is descriptive of the F-111 as a weapon system, and could well have a universal appeal". Firebolt was another term for a thunderbolt and was defined in the *Chambers 20th Century Dictionary* as "a bolt or shaft of lightning preceding a peal of thunder; anything sudden or irresistible", and by the *Concise Oxford Dictionary* as an "imaginary bolt or shaft viewed as the substance of lightning; a formidable threat". Thirlwell concludes his memo by advising that if common agreement on Firebolt could be gained, "the sooner it can be announced the better". So, Firebolt it was to be. Done and dusted as far as Thirlwell was concerned.

THE LONGLIST

By December 1966 DS9's touting had produced results and Mr K.C. McDonald of the Air Ministry laid out the possibilities for naming the F-111 in a memo to the DCAS. Taipan did not find favour, nor did the retention of the designation F-111. The basis for rejecting the latter was that "the 'F' stands for 'fighter', which, as far as we are concerned, is something [it] will not be". Sir Wallace Kyle was willing to accept Taipan as a second choice, but doubted whether the Americans would accept such a strong Australian connection.

McDonald listed the possibilities, along with who suggested them and why. These included "Merlin", as noted above, and "Warrior", from the Director General of Engineering (RAF), who felt it was "unbiased, martial and apposite to the aircraft". "Richmond" was suggested by the Director General of Equipment (DGE) at the Air



ABOVE Two F-111Ks were under construction at the General Dynamics factory at Fort Worth, Texas, at the time of the RAF order's cancellation in January 1968. One trainer, marked K2 on the fin, and one strike version (UK1) were some way towards completion; note the housing for the flight-refuelling probe in the upper nose section of UK1.

Ministry, as it was the name of a town in all three countries and "in keeping with the RAF traditions for naming bomber aircraft".

The DGE and his department had been busy pondering this, also suggesting "Scorpion", as it was descriptive of the aircraft and had a "sting delivered with great speed". Other suggestions included "Thunderstrike", a common natural phenomenon and "Panther", which would be in keeping with the SEPECAT Jaguar (the Memo of Understanding for which had been signed in May 1965). There was also "Thruster", which was descriptive and followed American practice for muscular names, as with the Convair B-58 Hustler. The DGE's final suggestion was "Odin", chief of the Norse gods and again in line with American practice with the Thor missile. Many of the rejects were listed by DS9, including "Falcon", "Swallow", "Thunderscourage", "Longbow" and "Arrow", plus a veritable gazetteer of town names: "Albion", "Alford", "Berwick", "Edinburgh", "Harrogate", "Langley", "Middleton", "Portland" and "Rochester".

McDonald moved on to examine the front-runners and had little time for Merlin, suggesting that if any name be revived, Typhoon was "better-sounding and more appropriate". Warrior was too susceptible to corruption to "Worrier", while Firebolt might have more hazardous implications. It was pointed out by DS9 that Firebolt could be easily confused with *Firebar*, the

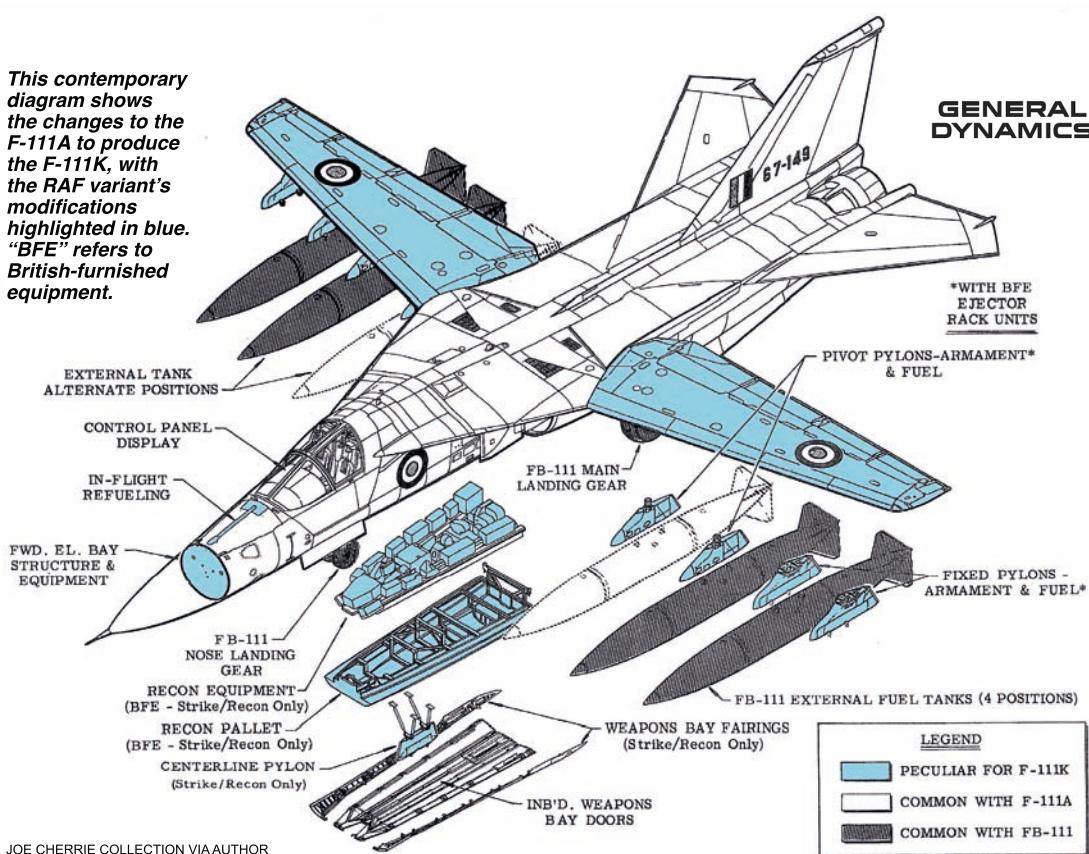
Nato reporting name for the Yakovlev Yak-28P. These objections were "valid", but the opposition to Merlin was "more a matter of personal taste" and because it had been previously used for an engine. There was also the small matter of Merlin being favoured by ACM Kyle, so it was included in McDonald's longlist of eight names for the Air Force Board to consider. These were Merlin, Richmond, Scorpion, Thunderstrike, Panther, Thruster, Odin and Typhoon.

A shortlist of three was put forward — Merlin, Richmond and Scorpion. Merlin was seen as apt for the reasons given by Kyle but McDonald asked, "will not the F-111 spread its wings when about to strike?" Scorpion was seen as a good counter to the Australian suggestion of Taipan. Richmond? McDonald considered this "a little pedestrian" but allowed that it followed RAF tradition and was common to all three countries. Pedestrian it may have been, but so too were Lancaster, Lincoln and Canberra — and they now had "positive meaning in Air Force circles".

Wisely, McDonald opted to leave the door open for the DCAS "to express his views on the names suggested" before drafting a paper for the Air Force Board. The next steps would be to discuss any possible names with the RAAF and USAF and if a common name was agreed, that would be the matter closed. If not, "we will have greater freedom of decision" and DS9 referred to the recent process to select a name — Nimrod —

This contemporary diagram shows the changes to the F-111A to produce the F-111K, with the RAF variant's modifications highlighted in blue. "BFE" refers to British-furnished equipment.

GENERAL DYNAMICS



JOE CHERRIE COLLECTION VIA AUTHOR

for the Hawker Siddeley HS.801 (see *What's In A Name?*, TAH7), but also stated that the need was not as pressing for the F-111K.

NEW YEAR, NEW DCAS, NEW NAMES

Initial fallout from McDonald's memo reached the DCAS's desk on January 9, 1967, along with a memo from the DCAS's Secretary, Pearson, part of which read: "DS9's exclusion of Firebolt from the shortlist has somewhat upset its sponsor" and suggested that the DCAS might not agree with the reasons for omission, but "a corrupt signal reporting Firebars where they should not be could start a war". As for Merlin, it was an appropriate name that "will probably commend itself to the Chairman of the Air Force Board".

Pearson formally replied to DS9's memo on January 11 and advised that "DCAS does not wish to express any particular views on the names suggested", although Pearson advised that the DCAS didn't like Taipan and had asked that "Thunderbolt" be added to the shortlist. At the end of January AM Emson was succeeded as the DCAS by AM Sir Peter Wykeham.

February saw the RAAF back in the name game, with Taipan still its favourite, although the Australian Air Board was receptive to British suggestions. The RAAF's view was that the name should be a short, easily-pronounceable single word and euphonious as well. Preferably it should "conform to the characteristics of the aircraft,

e.g. folding wings in flight". The name should not duplicate a name in use for other military equipment. If a town or city name was to be used, a number of Australian cities was listed: Sydney; Melbourne; Brisbane; Hobart; Adelaide; Perth and Darwin. Any of these would be consistent with Canberra, but they were "uninspired and unlikely to attract much overseas enthusiasm".

Weaponry could also provide a suitable name, for example Sword or Rapier, but the Australian Air Board's paper concludes by observing that the F-111 designation itself "has a certain amount of appeal, enhanced to a good deal by usage", and questioned whether a name would "find much acceptance unless it was extremely appropriate".

In light of this, on February 10, 1967, DS9 advised the newly-appointed DCAS that it was of the opinion that unless the Air Force Board had "no strong preference for a particular name, it might be a good idea to offer a shortlist to the Australian and American authorities and be prepared to accept their choice". At the bottom of the memo, the DS9 official has written, in pencil, that it had been pointed out that the aircraft's reconnaissance task had not been covered in the names suggested, and advises that, since Merlin is a member of the hawk family, "which is noted for its keen eyesight", this was a foregone conclusion. In a less legible hand is written: "Hawks do not look for information". The F-111 name game was becoming ever more pedantic.



ABOVE Another view of K2 (USAF serial 67-0149) and UK1 (67-1050) at Fort Worth. The F-111K was to use the longer wings of the US Navy's proposed F-111B interceptor (which was also cancelled), the strengthened undercarriage of the USAF's FB-111A strategic bomber variant, and the upgraded avionics suite of the improved F-111D.

The Air Force Board met on February 13, 1967, and Item III on the agenda was naming the F-111. So the DCAS's paper was discussed. Naming it after a bird of prey or city common to the UK, Australia and USA was possible, and there was agreement that the RAAF's suggestions were not suitable. Merlin would be the best bet for a bird name, but the DCAS suggested that there might be another suitable member of the hawk family after which to name the F-111. As for a city name, Richmond was considered the "most obvious candidate", so that became the third choice. From the Australian list Rapier was selected, becoming the fourth preference. The meeting ended with Wykeham being assigned the rueful task of informing the RAAF of the Air Force Board's conclusions. If any of these names proved acceptable to the RAAF, the DCAS would also notify General Dynamics, which would then discuss the name with the USAF.

Two days later a further 11 bird names were submitted to the DCAS, but none were considered suitable, these including "Harrier" and "Shrike", the latter being noted as "not a hawk, but a very

effective bird of prey". Wykeham, like Emson, preferred Merlin, and only three candidates were to be submitted to the RAAF. However, on February 17 a memo arrived from E.P. Kruse, head of S4 (Intelligence) at the Air Ministry, advising that the name Rapier had already been selected for the BAC ET.316 surface-to-air missile, and so was out of the running.

It fell to Merlyn Rees, Under Secretary of State for the RAF, to write the letter to Peter Howson in Canberra, explaining that the aboriginal names meant little to the British and Americans, while Taipan's Chinese connotations could upset the Americans. Rees also explained that Rapier, which the British "found very attractive", had been assigned to the BAC missile. This left Merlin and Richmond, and after explaining the reasoning behind them, invited Howson to comment. This letter was passed, via Jim Carruthers, to Air Cdre Parsons for distribution among the Australian Air Staff in Canberra.

Howson replied to Rees' letter on April 7, 1967, advising that the RAAF took a less-than-favourable view of the RAF's suggestions. Merlin,

The RAF's F-111Ks were to be serialled XV902–947, the TF-111K trainers being allocated XV884–887. This speculative example, in standard RAF grey and green camouflage, carries long-range tanks on its outer pylons with a BRU-3 rack holding six Mk 84 low-drag bombs on the mid-wing stations. Artwork by JUANITA FRANZI / AERÓ ILLUSTRATIONS © 2016





ABOVE Although the F-111 never entered service with the RAF, it did provide Australia with a highly effective independent strike capability from its introduction into RAAF service in 1973 until the type's final retirement from Australian service in late 2010. These F-111Cs were photographed during Exercise Red Flag in the USA in 2006.

from an Australian standpoint, was a famous aero-engine that had only recently left RAAF service, and as for city names, "the general view is that these are unexciting and that they do not fit or do justice to the aircraft, having regard to its role and capabilities". Richmond in particular might cause administrative confusion with the RAAF base of the same name.

AUSSIE RULES

Howson kept the best for last and explained that "we do have an Australian-rules football game out here which has a particularly strong and partisan following in Victoria". A minor matter perhaps, but Howson continued, explaining that one of the teams was called Richmond and that "you would perhaps appreciate that to choose Richmond could lead to complications and strong vocal opposition from supporters of other teams in the same competition".

Howson took the view that whichever name was chosen, there would always be misconceptions on the local, national and international levels. He also advised that the RAAF had decided to "stick with the basic title of F-111 and not concern ourselves anymore with a name", and that it was probably too late to apply a name anyway, as "F-111" had entered the aviation lexicon.

The meeting of the Air Force Board on April 10 discussed the Australian decision and in turn decided on the name Merlin for the F-111K. The DCAS doubted the Americans would adopt the name, so elected not to discuss it with General Dynamics or the USAF. Air Marshal Wykeham

also proposed that Merlyn Rees announce the new name in the House of Commons debate on the F-111K on May 1, 1967. This date caused some consternation as it was customary to announce the name of an RAF type on the day of its first flight — at least a year in the future for the F-111K. This was brought up at the next Air Force Board meeting on April 24 and in a note, Wykeham outlined the RAF's naming practice again and that the Air Force Board had "agreed to take no further action about selecting a name for the F-111K until nearer the time required by RAF practice".

Six months later the USAF's F-111 Systems Project Office (SPO) announced a competition to name the F-111, and the RAF officers assigned to the SPO requested permission to participate. Pearson, the DCAS's Secretary, asked on December 13 if Merlin was still the preferred name. This, according to Pearson, would be an "opportunity to persuade the Americans to adopt the name preferred by the UK" and that the DCAS should "decide on the best way to feed it into the American machine". The officers at SPO were informed that they could take part in the competition as long as they only submitted Merlin.

As we know, Merlin didn't win the SPO's competition, nor was it announced as the name for the F-111K. The contract for ten TF-111 and 40 F-111Ks was cancelled in January 1968, and the two F-111K airframes on the production line at the time of cancellation, one trainer and one strike variant, were integrated into the USAF. Which never named the F-111 after all.



Built at the Supermarine factory at Aldermaston to serve in the camera-equipped fighter-reconnaissance role, Spitfire FR.XIVe TZ138 was delivered to the RAF in July 1945 and transported to Canada by ship that November, after which it served with the RCAF. By the summer of 1949 the Griffon-powered fighter had been acquired by RCAF pilots Ken Brown and "Butch" McArthur, registered CF-GMZ and painted in racing colours for the USA's National Air Races in Cleveland, as seen here.

PHILIP JARRETT COLLECTION



AN EYE ON THE PRIZE

JUANITA FRANZI continues her series of articles on notable airframes and their markings with the story of the early icy years in Canada and brief racing career of a Supermarine Spitfire which still survives today

WHEN THE USA's National Air Races (NAR) resumed after World War Two, the event was promoted as "aviation's most thrilling peacetime spectacle". In 1949, to celebrate the NAR's 20th anniversary, the races were opened to foreign entrants. The total prize money ran to more than \$100,000 and the availability of affordable ex-military aircraft tempted many a hopeful pilot. Two Royal Canadian Air Force (RCAF) aircrew, Kenneth Brown and James "Butch" McArthur, began hatching a plan to represent their country in the closed-circuit Thompson Trophy speed race using a Supermarine Spitfire FR.XIVe. While both pilots served with the RAF during the war, it was at the RCAF Winter Experimental Establishment (WEE) at Edmonton that their paths first crossed.

Ken Brown, born in Moose Jaw, Saskatchewan, in 1920, joined the RCAF at the age of 20. After completing further training in the UK, Brown flew Armstrong Whitworth Whitleys with No 10 Sqn RAF on coastal duties detachments at St Eval, before converting on to Avro Lancasters and joining No 44 Sqn. A few months later his crew was selected to join new unit No 617 Sqn and begin training for Operation Chastise, the famous 1943 Dams Raid. Brown and his crew were part of the mobile reserve unit on the raid and tasked with attacking the Sorpe Dam. Although Brown's aircraft was damaged during the sortie, the crew

returned safely, with Brown being awarded a Conspicuous Gallantry Medal.

In 1945 Brown received a permanent commission with the RCAF and returned to Canada, where he was posted to the WEE at Edmonton, Alberta, originally established as No 1 Winter Experimental & Training Flight in 1943. The unit's role was to study cold-weather flying conditions and test aircraft, systems, survival gear and ground equipment in sub-zero conditions. The Flight undertook the testing of RCAF, RAF and, on occasion, USAF and US Navy aircraft.

The focus of Brown and McArthur's air racing plan was Spitfire FR.XIVe serial TZ138, which had been prepared by Rolls-Royce at Hucknall for winterisation trials before being transported by ship to Canada. It arrived by train at Edmonton on December 20, 1945, along with a Hawker Tempest and Gloster Meteor Mk III also destined for the WEE. Test flying of TZ138 began in late January 1946 and, after the summer break, recommenced during the winter of 1947–48. A notable event occurred in February 1947 when a set of de Havilland Tiger Moth skis was fitted to TZ138 to allow it to take off from the snow-covered runway at The Pas in Manitoba. One of the skis came adrift during the take-off run but the pilot successfully lifted off and flew the aircraft back to the WEE airfield.

Continued on page 70

SUPERMARINE SPITFIRE FR.XIVe

TZ138/CF-GMZ, 1945–49

ROLLS-ROYCE, HUCKNALL, NOTTS, 1945

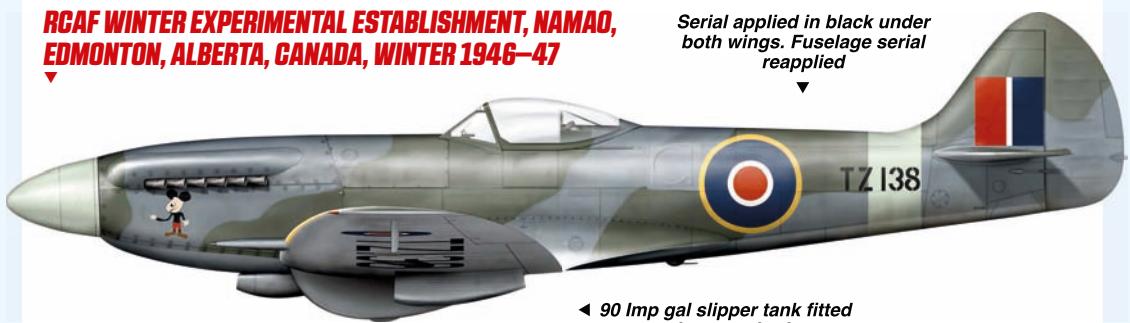
History of TZ138 based on research by Peter R. Arnold and Gordon Riley. Thanks also to Robert Stitt and Larry Milberry

RAF Standard Fighter Scheme: Dark Green and Ocean Grey camouflage; Medium Sea Grey undersurfaces



RCAF WINTER EXPERIMENTAL ESTABLISHMENT, NAMAO, EDMONTON, ALBERTA, CANADA, WINTER 1946–47

Serial applied in black under both wings. Fuselage serial reapplied



RCAF WINTER EXPERIMENTAL ESTABLISHMENT, NAMAO, EDMONTON, ALBERTA, CANADA, WINTER 1947–48

Natural metal finish; Type A-style roundels and post-war fin-flashes applied



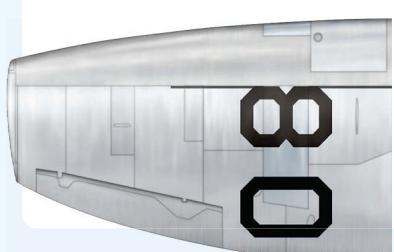
Serial applied in black under both wings

USA NATIONAL AIR RACES, CLEVELAND, OHIO, 1949

Esso and Imperial Oil logos applied on forward fuselage and fin



© Juanita Franzl 2016
AERO ILLUSTRATIONS



CF-GMZ wing detail: cannon and blisters removed; racing number "80" applied to upper surfaces of both wings

TZ138 wing detail circa 1947–48: Type A roundel applied to upper surfaces of both wings



Another view of CF-GMZ gleaming in the sun and ready to take on the Americans at the Cleveland races. The legend on the nose cowling proudly proclaims Edmonton, Canada, to be "The Crossroads of The World". The aircraft survives today as C-GSPT and is part of Bob Jens's warbird collection in British Columbia.



LARRY MILBERRY COLLECTION

Continued from page 68

Born in Tynemouth in the UK in 1913, Butch McArthur flew his first solo in early 1935 and joined the RAF the following year, later becoming a test pilot with the Experimental Section at the Royal Aircraft Establishment at Farnborough. Assigned to No 238 Sqn in June 1940, McArthur was posted two months later to Spitfire unit No 609 (West Riding) Sqn as the commander of B Flight. He soon proved to be an exceptional fighter pilot; within a month his tally was an impressive eight aircraft destroyed.

On September 15, 1940, McArthur suffered oxygen failure at 25,000ft (7,600m) during a dog-fight with Messerschmitt Bf 109s and blacked out. Regaining consciousness at low altitude, he managed to pull the aircraft out of its dive, but the sudden decompression damaged his ears. He required ongoing medical treatment and was banned from flying higher than 5,000ft (1,500m), effectively ending his service with No 609 Sqn and his combat career, although he still managed to shoot down a Bf 110 on September 25. McArthur was awarded the Distinguished Flying Cross in October 1940, and resigned from the RAF with the rank of Wing Commander on March 5, 1947.

McArthur went on to join the RCAF in 1948 and was assigned to the WEE. By the time he arrived, Spitfire TZ138 was in a polished metal finish; and, although it remained with the WEE during the winter of 1948–49, it was no longer being used for testing. On March 31, 1949, TZ138 was struck off charge and put up for disposal. The idea of entering the NAR may have been a late decision by Brown and McArthur, as it was not until August 4, 1949, that the pair purchased the Spitfire from the War Assets Corporation for \$1,250, and put it on the Canadian civil register as CF-GMZ. Sponsorship was acquired from Canadian petroleum company Imperial Oil, which had been involved with the WEE since 1943. Pat Reid, Imperial Oil's aviation sales manager, reportedly said, "you have a sure winner on your hands". Brown and McArthur were duly

given leave from the RCAF to attend the races.

The pair had little time to prepare the aircraft, as the general qualifying trials for the speed events were to be held during August 28–30 at Cleveland, Ohio, with the races taking place over the Labor Day weekend of September 3–5. The Griffon 65 engine was replaced and all unnecessary equipment removed before the aircraft was fitted with a 90 Imp gal slipper tank for the ferry flight to Cleveland.

In the qualifying trial McArthur flew the Spitfire to a ranking speed of 370·11 m.p.h. (596km/h), which gave him the opportunity to compete in the Tinnerman Trophy Race but was not sufficient to qualify for the Championship Race. On the Sunday McArthur flew CF-GMZ to a respectable third place in the Tinnerman race at an average speed of just under 360 m.p.h. (579km/h). Early on Monday morning, while the rest of the team slept, McArthur reportedly took the winnings and flew the Spitfire down to Florida, although quite why remains something of a mystery. A week later McArthur sold the aircraft to aerobatic pilot Jess Bristow for \$1,000.

The Spitfire remained in Florida for many years and changed ownership several times, sometimes under a cloud of intrigue. In the late 1960s it was returned to flying condition while registered as N5505A but was severely damaged during a forced landing in 1970. It changed hands a number of times before being restored again. Since 2000 it has resided in Canada and is registered as C-GSPT.

Brown and McArthur returned to the WEE after the races. Brown went on to serve as the CO of the Search & Rescue Flight at Trenton, and held a number of administrative positions before leaving the RCAF in 1968. McArthur served in Canada, the USA and Japan and was awarded the United Nations Korea Medal and the Canadian Forces Decoration. He left the RCAF around 1958 and was killed in the crash of a private aircraft in Las Vegas in May 1961.

WARPAINT BOOKS

WHAT'S IN A WARPAINT BOOK?

COMPLETE AND DETAILED HISTORY

AIRCRAFT IN DETAIL PICTURES

AIRCRAFT COLOUR AND CAMOUFLAGE DRAWINGS

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7 Junkers Ju88	25 Short Sunderland	43 F-104 Starfighter
8 Hawker Hunter	26 Bristol Blenheim	44 Venom
9 F4F Wildcat/Martlet	27 DH Vampire	45 B-57 Canberra
10 Vickers Wellington	28 Fairey Firefly	46 Halifax
11 DH Sea Vixen	29 Hawker Sea Hawk	47 F-101 Voodoo
12 Fairey Swordfish	30 Avro Vulcan	48 Lylander
13 Fw200 Condor	31 RAF/RH Phantoms	49 Fiat G.91
14 BAC Lightning	32 Boston/Havoc	50 Beaufort
15 Short Stirling	33 Heinkel He177	51 Lockheed Neptune
16 Hawker Sea Fury	34 Avro Lincoln	52 Albacore
17 Gloster Javelin	35 Fairey Barracuda	53 Anson
18 Douglas Skyraider	36 Handley Page Victor	54 Whirlwind

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59 Lockheed Hudson	77 Curtiss P-40	95 Sea King
60 Eng/Elec Canberra	78 Folgore - Veltro	96 B-24 Liberator
61 S.79 Sparviero	79 Catalina	97 Vigilante
62 Hastings	80 Saab Draken	98 York
63 Valiant	81 Junkers Ju52	99 F3H Demon
64 Convair F-102	82 Jet Provost	100 F-8F
65 Wessex	83 Fairey Battle	101 Tiger Moth
66 Bulldog	84 F6F Hellcat	102 Convair B36
67 Gnat	85 Scimitar	103 Manchester
68 Brigand	86 Wellesley	104 F 111
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THE
IMPERFECT

10

At the turn of the 1930s Sweden's fledgling air force was in need of an advanced two-seat biplane trainer with excellent aerobatic qualities. Enter the Gerhard Fieseler-designed Raab-Katzenstein RK-26 Tigerschwalbe, 25 heavily modified examples of which entered Swedish service as the Sk 10. The significant modifications made it a very different aircraft, however, and the accident-prone Sk 10 became the subject of a major procurement controversy, as **JAN FORSGREN** relates



MAIN PICTURE An Sk 10 taxies in after a solo training flight. An attractive, well-proportioned biplane, the type nevertheless required a much higher level of skill to fly than other contemporary trainers, particularly the de Havilland Moth, which some Flygvapnet officers felt was a more suitable training machine.

ARLANDA CIVIL AVIATION COLLECTION

RIGHT German aerobatic champion Gerhard Fieseler with one of the Raab-Katzenstein biplanes he helped to design in the late 1920s. Fieseler would go on to win a German design competition for a STOL liaison aircraft in 1936 with his famous Storch.



FESTABLISHED AT KASSEL, central Germany, on November 11, 1925, the Raab-Katzenstein Flugzeugwerke GmbH designed a number of light aircraft, including the RK-9 Grasmücke (Warbler) and the RK-26 Tigerschwalbe (Tiger Swallow), the latter being a nimble two-seat biplane designed by aerobatic specialist Gerhard Fieseler, later to become famous for his company's insect-like Fi 156 Storch. Following its selection by Flygvapnet (Royal Swedish Air Force) as its basic training aeroplane, the RK-26 was modified to incorporate a heavier but more powerful engine and strengthened airframe. In total, 25 RK-26s were built by Swedish company Aktiebolaget Svenska Järnvägsverkstäderna Aeroplanaavdelningen (ASJA). [For more on this company see the author's feature on the ASJA Viking in TAH9 — Ed.]

In the event, the Sk 10 (Sk for *Skol* — trainer), as it was designated in Flygvapnet service, had considerably different flight and handling characteristics to the original RK-26, which, according to some pilots and journalists, was entirely because of the more powerful engine and the various airframe reinforcements.

GENESIS OF A CONTROVERSY

Soon after the type entered service, two Sk 10s were lost in crashes within a month of each other, the national media labelling the machine as "dangerous". The newspapers were also quick to point out the deficiencies of Flygvapnet's procurement policies. Within the ranks of the air force, two opposing opinions quickly emerged; one was in support of the Sk 10 and the other fervently opposed it. As a result, an independent Air Commission was appointed to provide an explanation and make recommendations. It quickly developed into a major controversy, however, with wildly different opinions expressed by Flygvapnet personnel, politicians and the national media about pilot training, aircraft acquisition and



ABOVE Gerhard Fieseler beside Raab-Katzenstein Kl.1c Schwalbe D-1212 during the 1928 German aerobatic championships. **BETWEEN** A rare head-on view of the first RK-26 to be imported into Sweden, SE-ACO, which was fitted with a 200 h.p. Armstrong Siddeley Lynx, replaced on production Sk 10s with the heavier Walter Castor IA.

design. Of the 25 Sk 10s built, no fewer than 18 were written off in crashes between 1933 and 1943. So how had this controversial biplane got a foothold in Flygvapnet in the first place?

By the late 1920s Flygvapnet was in a poor state. Formed on July 1, 1926, the organisation had inherited most of its aircraft from the army and naval air services, many of these machines remaining in service despite being obsolescent and sorely lacking in performance. With only a handful of fighters available alongside a few rarely flown Fiat BR-series bombers, the primary tasks of Flygvapnet were pilot training, observation and limited maritime reconnaissance.

At this point Flygvapnet's standard basic trainer was the FVM Dront (a licence-built Phönix C I),

with a few 120 h.p. Mercedes-engined Albatros B IIs also being used for basic flight training. Both the Dront and the Albatros were obsolete, a point well understood before the establishment of Flygvapnet. Single examples of the Gloster Grouse and Avro 504N had also been acquired for evaluation. At one point the purchase of eight Grouses was considered, but no order ensued.

A review of the future requirements of Flygvapnet's flying training programme resulted in three different categories of training aircraft being identified. The first two were Type I (primary training) and Type II (advanced training, including aerobatics), with the latter serving as an intermediate step between primary training aircraft and higher-performance combat aircraft.





ABOVE Retaining the *Tigerschwalbe's* purposeful lines, the Sk 10 was nevertheless an entirely different animal, being considerably heavier — with a consequently higher wing loading — than its forerunner. In total, 25 examples were built, nearly three-quarters of which had been written off by the time the last example was retired in 1945.

The Type III trainer was intended for gunnery and observer training, but no such specific trainer was ultimately purchased.

The Heinkel HD 36 was chosen for Type I duties, with 21 being acquired as the Sk 6. However, Mercedes engines of Great War vintage, which had remained stored since the early 1920s, were chosen to power the Sk 6s. Unsurprisingly, these engines turned out to be of such poor quality that they suffered numerous mechanical failures, leaving the Flygvapen Flying School, based at Ljungbyhed in southern Sweden, without aircraft. In the event ten de Havilland D.H.60T Moths were acquired as a quick interim replacement and designated as Sk 9s. All of the Moths were delivered within two months. The school's flight instructors considered the Moth to be a "nice toy", but of little use for the training of military pilots. (Interestingly, in light of the Sk 10's later "killer" reputation, four Sk 9s were written off within ten weeks in late 1931. Nevertheless, the Moth was generally considered to be a "safe" aeroplane.)

One aircraft which appeared suitable as a Type II trainer was the German RK-26 *Tigerschwalbe*. Powered by a single 200 h.p. Armstrong Siddeley Lynx seven-cylinder radial engine, the RK-26 had a maximum speed of 125 m.p.h. (200 km/h), an empty weight of 1,235lb (560kg) and a loaded weight of 1,895lb (860kg). According to the 1930 edition of *Jane's All the World's Aircraft* the RK-26 could also be fitted with a 260 h.p. Walter Castor I seven-cylinder radial engine.

The RK-26's exceptional agility was proven when Gerhard Fieseler used the type to win several world aerobatic championships. While returning to Sweden from the Paris Air Salon in late 1929, the Commander of the Flygvapen Flying School, Nils Söderberg, was ordered to pay a visit to the Raab-Katzenstein factory at Kassel. Söderberg put the RK-26 through its paces, finding it well-suited to the requirements of a Type II trainer. The following year Fieseler himself demonstrated the RK-26 at Ljungbyhed.

As a result, one example, originally registered in Germany as D-1818 (c/n 104), was purchased by Linköping-based ASJA on December 15, 1930, and registered SE-ACO on February 23, 1931. The aircraft was placed at the disposal of Flygvapnet for formal evaluation, which took place at Ljungbyhed during July 5–17 that year. At the same time, ASJA acquired a production licence for the type, the contract stipulating that two Sk 10s would be ordered for service trials, with additional orders depending on the outcome of the trials. The order for the two Sk 10s plus one static test airframe was placed on February 29, 1932.

A REDESIGN AND SERVICE TRIALS

The Sk 10 was, for its time, of thoroughly orthodox construction, the fuselage consisting of a fabric-covered welded-steel-tube frame. The engine mount was enclosed within aluminium cowlings and the wing structure was built entirely from wood. The flying instructor and student pilot sat



ABOVE One of the first production Sk 10s was photographed on January 25, 1934, probably just before its delivery to Flygvapnet. The Walter Castor IA seven-cylinder radial engine was of Czechoslovakian origin, the Walter company being a specialist in small three-, five-, seven- and nine-cylinder radials throughout the 1920s.

in tandem separate cockpits with fully duplicated flight controls. According to the wishes of Sweden's Royal Air Board, the original Lynx engine was replaced with the more powerful Walter Castor powerplant. The latter offered 20 per cent more power — but was also 20 per cent heavier. The Lynx had to be replaced because, in 1930, the Armstrong Siddeley series of engines had lost the battle against the Bristol Jupiter in the long, frustrating selection process for a standard Flygvapnet engine.

Significantly, although the power loading remained the same, the wing loading of the Sk 10 had increased by some 20 per cent. This, along with the strengthened — and thus heavier — rear fuselage, contributed to make the Sk 10 a somewhat different aeroplane from the original RK-26. The empty weight had increased to 1,720lb (780kg), and the maximum take-off weight to 2,500lb (1,135kg). The modification work was assigned to Henry Kjellson and Ivar Malmer, both experienced in aircraft design and aerodynamics.

The first two Sk 10s, accordingly modified, were delivered to Flygvapnet in September and October 1932, after which they were submitted to two weeks of service trials at Wing F 5 at Ljungbyhed. The only instructions given regarding the purpose and extent of the service trials stated that they were to evaluate "strength on landing during normal conditions; circumstances during landing and take-off both in a headwind and crosswind; the suitability of

the flight instruments and their location as well as the suitability and location of the flight controls". This was, of course, wholly insufficient for the introduction of a new basic trainer. Nevertheless, on December 20, 1932, Nils Söderberg (**INSET BELOW**) submitted a report regarding the results of the operational evaluation of the Sk 10:

"The aeroplane is not easy to fly. In order to achieve correct flight, correct rudder movements are required. Any errors performed by the pilot in this matter are immediately noticeable. For this reason the aeroplane should serve well in its intended purpose, following initial training on another lighter primary trainer, for learning to fly correctly, with tidiness and precision."

Söderberg continued:

"Without displaying dangerous tendencies, the aeroplane should provoke carefulness and incite respect for flying, which is a foundation for proper judgment. As an intermediate for combat aeroplanes, the aeroplane appears well-suited."

Following the conclusion of the trials, an order was placed for a total of 25 Sk 10s. Although Söderberg had initially expressed disappointment that the excellent flight characteristics of the RK-26 had largely disappeared during the aeroplane's transformation into the Sk 10, he still considered it suitable for advanced flight training. Indeed, it would raise the pilots' level of attentiveness and proficiency. Handling the Sk 10 was demanding, but that was, in essence, what was required from





ABOVE A report on the "Tiger-Swallow" in the June 1933 issue of American magazine Popular Flying explained that "the great strength of the machine is due to the use of tubes and sheets of Swedish nickel-chrome steel. This steel has a tensile strength almost triple that of the tubing and sheet used in most aircraft". But it was also heavier.

this kind of aeroplane. Getting an Sk 10 out of an inverted spin was deemed to be the most difficult situation from which to recover.

ACCIDENTS BEGIN . . .

In mid-1933 a number of Sk 10s were used for the advanced fighter training course at Wing F 1 at Västerås. Two Sk 10s were lost, the first on June 8, when Lt Palmlad was killed when he failed to recover from an inverted spin. The cause of the accident was determined to be pilot error. The following month, on July 7, a second Sk 10 was lost in similar circumstances. The pilot, Herbert von Schinkel, baled out successfully, although the passenger, Lt Clarence von Rosen, was killed. As a result the Swedish media provided several sensationalist and generally inaccurate reports on the "dangerous" Sk 10.

On a visit to Sweden in 1933 the famous Ameri-

can aviator Charles Lindbergh was asked to fly the Sk 10. His rather underwhelmed verdict was that the Sk 10 was "all right". According to the press it was all an "unsavoury American publicity stunt arranged by a Swedish manufacturer which had failed to build a [satisfactory] aeroplane".

Restrictions were implemented for using the Sk 10 for aerobatic training. The opinions of Flygvapnet pilots were polarised, with the more experienced flying instructors considering the restrictions unnecessary, while others strongly believed that the Sk 10 was a "killer". The opinion that Flygvapnet should be equipped with safer aeroplanes became popular among Flygvapnet personnel, politicians and journalists, and was known as the "Moth spirit". Obtaining such aeroplanes would mean fewer accidents. Conversely, a military pilot has to attain a certain level of capability in handling high-performance

A line-up of Sk 10s at Rinkaby airfield in southern Sweden in September 1936, by which time five of the 25 had been written off in accidents, although all of the mishaps that befell the type were ascribed to pilot error, rather than an inherent design flaw in the aircraft. Despite the high attrition rate, only two people were killed in Sk 10s.

ARLANDA CIVIL AVIATION COLLECTION





ABOVE The cockpit of Sk 10 c/n 19, serial 535, wearing the number of its unit, F 5, ahead of the national tri-crown marking, and individual code number "41" aft of it, as per standard in 1936. The controls were duplicated front and rear, and the type was intended to provide the requisite skills to convert to Flygvapnet's Bristol Bulldogs.

combat aeroplanes; as such, the Sk 10 was suitable, whereas the Moth was not.

An Air Commission comprising Henry Kjellson, Ivar Malmer and Flygvapnet officer Axel Ljungdahl, as well as high-ranking politicians, was subsequently appointed by the government at the end of July 1933 to conduct a thorough investigation into the crashes and the suitability of the Sk 10. (The first Air Commission had convened in 1931 to investigate the crash of a Svenska Aero J 6 *Jaktfalken* fighter.) The findings of the commission were inconclusive, so the type was submitted to a second set of service trials during the winter of 1933–34, the net result being essentially the same as that following the initial service trials. The restrictions were lifted and the Sk 10s were returned to service. Towards the end of the trials, Nils Söderberg found himself unable to recover from an inverted spin in an Sk 10, and was forced to bale out.

AN INDEPENDENT EVALUATION

In order to solicit a neutral opinion in the matter of the suitability — or otherwise — of the Sk 10 as a primary trainer, one example was despatched to the Royal Aircraft Establishment (RAE) at Farnborough in the UK. The somewhat less-than-enthusiastic verdict was as follows:

"Too sensitive rudders; stall characteristics less suitable. Unsuitable for pilots with 50hr of flight experience on Moths and as a training aeroplane for older pilots. Dangerous at low altitude, but

ASJA Sk 10 DATA

Powerplant 1 x 240 h.p. Walter Castor IA seven-cylinder air-cooled radial piston engine

Dimensions

Span	8·4m	(27ft 7in)
Length	6·44m	(21ft 2in)
Height	2·7m	(8ft 10in)
Wing area	20·2m ²	(217ft ²)

Weights

Empty	780kg	(1,720lb)
Loaded	1,135kg	(2,500lb)

Performance

Maximum speed	191km/h	(119 m.p.h.)
Service ceiling	5,000m	(16,400ft)
Normal range	550km	(340 miles)

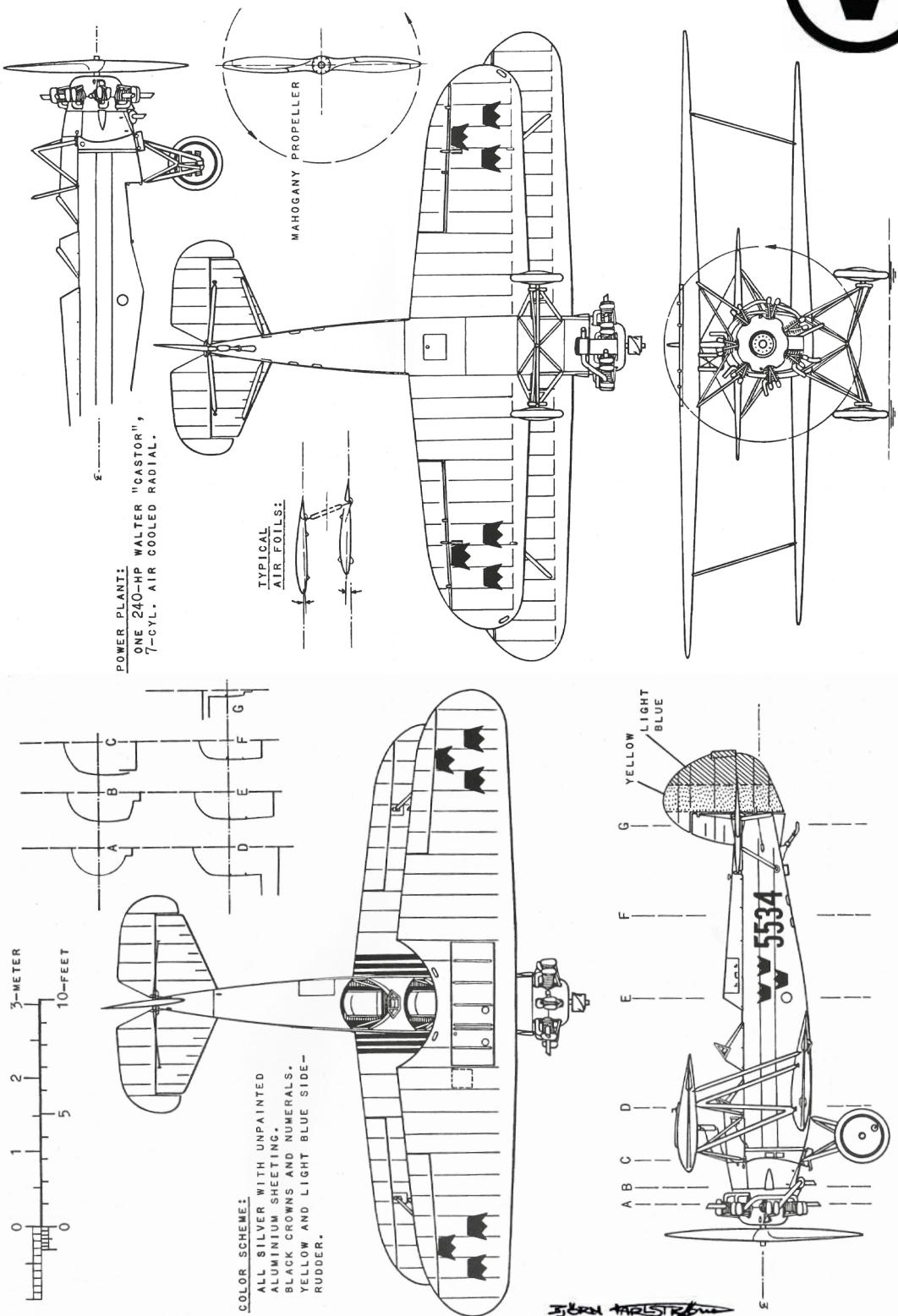
highly manoeuvrable for aerobatics. Better, less dangerous aeroplanes are available."

It would appear, however, that the RAE erroneously believed that student pilots would make only one flight in the Sk 10 with a flying instructor, after which they would fly solo. Regular Flygvapnet pilot training at the time involved 6hr of dual instruction on the Sk 10 before the student pilot was allowed to go solo. Furthermore, the RAF had a different training syllabus from that of Flygvapnet, which made direct comparisons difficult.

In his memoirs, Söderberg refers to the Sk 10

ASJA Sk 10

Original artwork by Björn Karlström



controversy as a “psychosis”, and the loss of 18 aircraft out of 25 delivered does indeed appear inordinately high. However, one must take into consideration that only about half of these accidents occurred during pilot training, with only two fatalities (one of which was a passenger) and four pilots baling out after failing to recover from an inverted spin. The cause of these accidents was all attributed to pilot error. The Sk 10 loss rate between 1933 and 1943 was as follows: 1933 (2); 1935 (2); 1936 (4); 1937 (4); 1938 (1); 1939 (3); 1942 (1) and 1943 (1).

One Sk 10 has been preserved. After being withdrawn, serial 536 was used for ground instruction. A cut-down four-bladed propeller was fitted, with aspiring mechanics honing their skills in starting the engine of the old Sk 10. It was restored after being withdrawn from service in 1944 and is on display at Flygvapenmuseet at Linköping.

THE ORIGINAL RK-26

With ASJA establishing production of the Sk 10, the original RK-26 SE-ACO was rebuilt to Sk 10 standard. On June 16, 1932, SE-ACO was cancelled from the register and re-registered as SE-ADK, being used by ASJA as a prototype for the Sk 10 production series. In early 1934 the aircraft was disposed of by ASJA. It subsequently enjoyed a fairly long career, being owned by a succession



ABOVE The original RK-26 SE-ACO was re-registered as SE-ADK in 1932, before being sold in 1934 to the first of a number of new owners, including the Norrköping Automobile Flying Club and Lennart Hemminger, who donated the aircraft for use by F 19, Sweden's volunteer unit in Finland, in early 1940.

of private owners, before eventually being taken on strength by the Swedish volunteer Wing F 19 during the Russo-Finnish Winter War.

In early 1940 the aircraft was fitted with skis and flown to Finland on February 9. It was rarely used, being slightly damaged in an accident on March 23 the same year. It was quickly repaired and arrived back in Sweden three days later. Its career finally came to an end when it was damaged beyond repair at Bromma airport on March 26, 1943, and scrapped. 

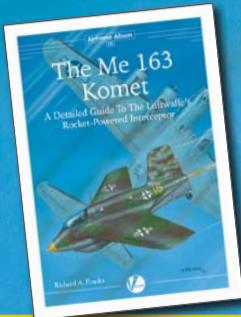
ASJA Sk 10 IN FLYGVAPNET SERVICE Compiled by Jan Forsgren

Serial	C/n	Taken on charge	Struck off charge	Code/s	Remarks*
521	5	27.9.32	30.10.36	5521, F 5-31	W/o 5.10.36; TT 345hr,10min
522	6	21.10.32	13.9.38	5522, F 5-32	W/o 5.4.38; TT 481hr 30min
523	7	5.5.33	12.11.35	5523	W/o 27.9.35; TT 111hr
524	8	11.5.33	15.8.33	1524	W/o 7.7.33; TT 21hr, 25min
525	9	16.5.33	26.6.42	1525, F 5-33	Wfu owing to wear and tear
526	10	6.6.33	4.4.39	1526, F 5-34	W/o 22.2.39; TT 276hr 20min
527	11	15.6.33	15.8.33	1527	W/o 8.6.33; TT 17hr 15min
528	12	22.12.33	16.10.36	5528	W/o 11.9.36; TT 301hr 40min
529	13	22.12.33	30.10.36	5529	W/o 5.10.36; TT 367hr 55min
530	14	3.1.34	26.6.42	5530, F 5-36	Wfu owing to wear and tear
531	15	29.11.33	26.6.42	5531, F 5-37	Wfu owing to wear and tear
532	16	29.11.33	13.9.38	5532, F 5-38	W/o 6.12.37; TT 477hr 50min
533	17	29.11.33	26.6.42	5533, F 5-?	Wfu owing to wear and tear
534	18	29.11.33	4.6.37	5534	W/o 7.5.37; TT 319hr 5min
535	19	15.11.33	26.6.42	5535, F 5-41	Wfu owing to wear and tear
536	20	3.1.34	19.12.44	5536, F 1-101	Retired. Preserved at Flygvapenmuseet
537	21	15.12.33	16.3.36	5537	W/o 9.2.36; TT 138hr 30min
538	22	1.5.34	19.9.45	5538	Wfu owing to wear and tear; TT 572hr
539	23	3.1.34	13.3.43	5539	W/o 16.12.42
540	24	3.1.34	12.5.39	5540, F 5-45	W/o 30.3.39; TT 438hr 55min
541	25	3.1.34	20.9.35	5541	W/o 25.7.35; TT 12hr 20min
542	26	2.1.34	24.2.24	5542, F 5-46	W/o 27.1.39; TT 382hr
543	27	3.1.34	10.12.43	5543	W/o 25.10.43; TT 720hr
544	28	23.2.34	4.6.37	5544	W/o 5.3.37; TT 196hr 50min
545	29	23.2.34	8.12.37	5545	W/o 19.11.37; TT 239hr 35min

* W/o — written off Wfu — Withdrawn from use TT — Total time flown

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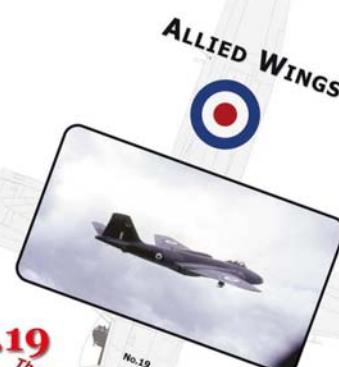


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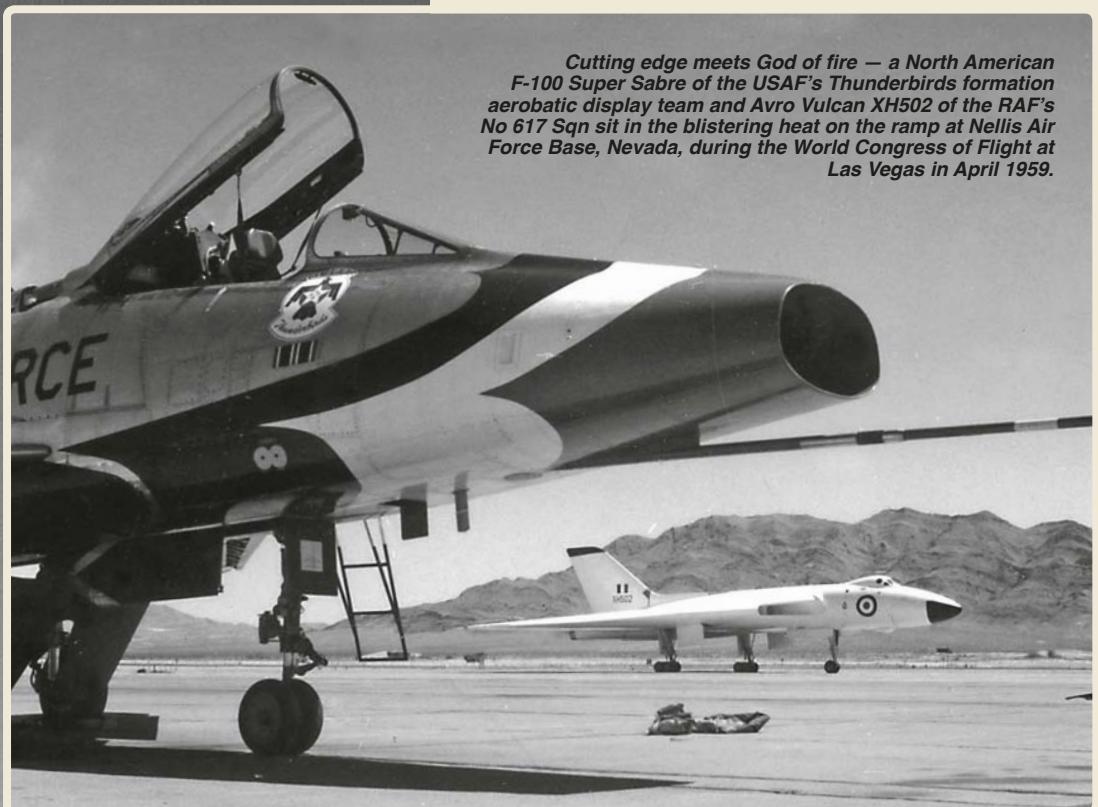


Viva Las Vegas!

In April 1959 the brand new Las Vegas Convention Center became the futuristic epicentre of the ambitious first World Congress of Flight, in which the Western world's leading lights in aviation and spaceflight came together to exchange ideas and enjoy a week of spectacular demonstrations of state-of-the-art aeronautical hardware, as NICK STROUD explains



Cutting edge meets God of fire — a North American F-100 Super Sabre of the USAF's Thunderbirds formation aerobatic display team and Avro Vulcan XH502 of the RAF's No 617 Sqn sit in the blistering heat on the ramp at Nellis Air Force Base, Nevada, during the World Congress of Flight at Las Vegas in April 1959.



“**A**T LAS VEGAS, a milestone in aviation history; the world's first Congress of Flight, sponsored by the Air Force Association, brings together the full cycle of flight; man in air and man in space . . .” Thus the rich, American baritone of the anonymous *US Air Force News* announcer prefaces a vintage newsreel report on the ambitious World Congress of Flight, held in the famous gambling and leisure hotspot of Las Vegas, Nevada, nestled deep in the Mojave Desert, in April 1959. The idea was, to quote the promotional blurb of the time, “to bring together all elements of flight — designers, producers, operators, administrators and users — to unite them in a common cause; the advancement of aeronautics and astronautics — the twin sciences of flight”.

As a projection of contemporary American air power it was unparalleled, with a week of dramatic (and by all accounts, ear-splitting) displays of civil and military hardware keeping the attendees thrilled, even if it turned out to be not quite the international affair the organisers had envisioned. Of the 77 nations invited to participate, only around half accepted, and their contributions were ultimately fairly meagre. Nevertheless, as a spectacle, it was the West's aviation event of the year, with formation aerobatic displays from homegrown and international teams cleaving the gin-clear cerulean canopy, state-of-the-art fighters trailing crimson blooms of napalm along the tumbleweed-strewn desert floor and nuclear-capable bombers tearing the sky asunder as they



ABOVE *The World Congress of Flight was by no means only about the military uses of aeronautical technology. Civil aviation was also well-represented, with America's most modern airliners on show, including Boeing 707 N7506A, named Flagship District of Columbia in American Airlines service, which had first flown in January 1959.*

demolished the sound barrier on max-speed low-level runs past the makeshift grandstands at Indian Springs, 45 miles (70km) west of Vegas. Intended to be a "brains trust" for the great and good in aviation and spaceflight, where ideas could be put forward and discussed, the first World Congress of Flight (WCF) looked set to become America's equivalent of Europe's vital gatherings of industry at Farnborough and Paris.

A BRIGHT IDEA

The force behind the WCF, the Air Force Association (AFA), was formed in 1946 as a civilian independent non-profit organisation with the declared aim of "perpetuating the fellowship of former members of the Air Force and providing a national organisation which will help to educate its own members and the public at large in the proper development of airpower". The idea had grown from discussions between Gen H.H. "Hap" Arnold, C-in-C of the US Army Air Forces during the Second World War, and Maj-Gen Fred Anderson, Commanding General of the Eighth Air Force, based in the UK during the war. Both keen advocates of air power and its advancement, the pair appointed Maj-Gen Edward P. "Ted" Curtis, Great War fighter ace and Chief of Staff of the USA's Strategic Air Forces in the European Theatre of Operations during the Second World War, as the AFA's founding Chairman. The new organisation was formally established on February 4, 1946. Its objectives were translated into action by means of annual conventions and symposia, and, significantly, lobbying for the establishment of

an autonomous United States Air Force (USAF), independent of the US Army, which came into being in September 1947.

The AFA continued its work through the 1950s, organising pageants and educational programmes, as well as becoming a powerful lobbyist on behalf of American industrial and military preparedness. By 1958, with the Soviet Union's startling October 1957 launch into orbit of Sputnik I having stunned the USA into a crash catch-up programme, the subject of space was very much on the AFA's agenda. Accordingly, the Association set about educating the American public on the new capabilities and implications of aerospace power and its impact on modern society, and it was as part of this programme that the concept of a World (for which read Western world) Congress of Flight was first mooted.

The idea was to provide the infrastructure for a major exposition run in co-operation with the international aerospace community, including diplomats, industry executives, military leaders, scientists and policy-makers, against a backdrop of cutting-edge aerospace technology, such as missiles, spacecraft and state-of-the-art military and civil aircraft.

Billed as "The World's Greatest Air-Space Show", the WCF was announced in late 1958, *Aviation Week* reporting that three major gatherings — a "Jet Age Conference", "Space Age Symposium" and "Missile Management Meeting" — would form the backbone of the week-long event to be held during April 12–19, 1959. By January that year it had been



ABOVE Many of the more impressive displays of airpower demonstrated at the Indian Springs Armament Range during the week of the Congress were performed by F-100s, the type being the USAF's primary front-line fighter-bomber. This example, F-100D 55-2795, is seen at Nellis and later went on to serve with the Turkish Air Force.

announced that some 88 companies had ordered space to exhibit at the outdoor and indoor display areas, including Rolls-Royce and the Hawker Siddeley Group from the UK and the *Société Nouvelle des Aéronautiques* (now GIAS) from France, although of these only the British engine manufacturer ultimately attended.

THE SIX-MILLION DOLLAR VENUE

With numerous American aviation organisations signing up to support the venture, including the Air Transport Association, National Business Aircraft Association, Aero Medical Association, Flight Safety Foundation, Federal Aviation Agency and US Department of Education and others, plus the worldwide *Fédération Aéronautique Internationale*, a venue capable of accommodating the diverse needs of such a large conclave had to be found — no mean task.

Founded as a city in 1905, Las Vegas had seen exponential growth since the legalisation of gambling in the city in 1931, which happened to coincide with the beginning of the construction of the nearby Hoover Dam, both of these factors insulating the city to some degree from the effects of the Great Depression.

By the late 1950s it had become obvious that the city's success as a gambling (and divorce) destination had reached a peak, and although "Sin City", as it was known, enjoyed lucrative holiday seasons, occupancy rates in hotels dropped through the floor in the slow tourist months. A new string to the city's gilded bow was required, and, with the surrounding desert offering plenty of space in which to develop, the

city began exploring its potential as an attractive conference venue, offering a convenient marriage between the business community and the recreation industry.

The result was the construction of the \$6m Las Vegas Convention Center, one block east of the Las Vegas Strip on the site of the defunct Las Vegas Park Speedway horse- and automobile-racing track. Funds would be raised by the imposition of a room tax on nearby hotels, which would stand to gain from the proximity of the new conference venue. Designed by Adrian Wilson & Associates (with Harry Whitney as Consulting Architect), the 6,300-seat Convention Center represented a very 1950s idea of the future, its gleaming silver-domed rotunda giving the impression of a recently-landed flying saucer.

Next to the attention-grabbing centrepiece was a conventional exhibition hall of some 90,000ft² (8,400m²), beyond which was another 2,000,000ft² (185,805m²) of outdoor exhibition area. With McCarran Field, Las Vegas's civil airport, a mere five miles (8km) to the south, the USAF's Nellis base eight miles (13km) to the north-east, plus the Sky Haven general aviation airfield (now North Las Vegas Airport) three miles (5km) to the north-west, the new Convention Center offered the perfect spot to hold the AFA's inaugural World Congress of Flight.

The civil aircraft on show would be based at McCarran, the military hardware at Nellis and dramatic demonstrations of the latter could be undertaken at the USAF Armaments Range at Indian Springs. The exhibition area beside the Convention Center would house various static



ABOVE The main exhibition hall in the Las Vegas Convention Center contained stands advertising the wares of numerous companies, including those of Northrop (TOP LEFT), British company Lucas-Rotax (TOP RIGHT) and Lockheed (BOTTOM LEFT). It wasn't just aviation either; General Motors displayed its space-age car, the Firebird III, the concept for which had been influenced by jet fighter design, as covered in From Skyray to Firebird in TAH2.

BELOW Representing the new generation of turboprop airliners at McCarran Field, along with a Lockheed Electra and a Fairchild-built Fokker F-27, was Convair 440 N440EL (formerly PP-AQE with VARIG), converted by Canadair in early 1959 to carry a pair of Napier Elands, to become a 540.





ABOVE One of the more unusual general aviation exhibits at McCarran was McKinnon G-21C Goose N150M, converted by Angus "Mac" McKinnon to be powered by four 340 h.p. Lycoming flat-six air-cooled supercharged piston engines in place of the original Grumman amphibian's pair of 450 h.p. Pratt & Whitney Wasp Junior radials.

exhibits, including several missiles, a mock-up of the futuristic North American X-15 and various vehicles and equipment displays. In charge of the whole shooting match was Ted Curtis, the AFA's founding Chairman, who had subsequently served as President Eisenhower's Special Assistant for Aviation Activities and was then on the board of Eastman-Kodak.

Thus the stage was set for the most ambitious aviation event held in the USA up to that time, during which, according to the promo, "symposia and conferences will explore flight in terms of international security and human welfare". It would "analyse the social, economic, political and moral problems which accompany the progress of flight". Furthermore, the project was "dedicated to the belief that greater world knowledge of aircraft, missiles and spacecraft — in realistic perspective — will help bring the world closer to permanent peace". Despite the stirring rhetoric about bringing the world together through aviation and spaceflight, neither the Soviet Union nor the People's Republic of China was invited. Obviously.

START THE WEEK

By the end of March 1959 the Convention Center was on schedule for completion for the opening of the WCF, its maiden conference, and plans for the week's activities were well advanced. A preview for the press would be held on Sunday April 12, with the keynote Jet Age, Missile Management and Space Age conferences arranged for Monday April 13, Thursday April 16 and Friday April 17 respectively, with some 87 smaller specialist group meetings and conferences to be held by 47 different companies or organisations between the main events.

Flying demonstrations by the civil aircraft at McCarran would be performed on the Monday after the first Jet Age conference, with a full day of military demonstrations on Wednesday April 15 (to coincide with the NATO tenth anniversary celebrations). The following Saturday and Sunday would be public days, with free access to the exhibition halls and McCarran Field for the flying displays. In typical 1950s American style, the organisers were determined to make the event bigger and better than its European counterparts. As American magazine *Flying* remarked in its March 1959 issue:

"Both Farnborough and the Paris show are excellent displays, but nowhere has it been possible to bring together all elements of flight on a worldwide basis to study, to discuss, to see demonstrated the full range of equipment which constitute the tools with which we must work to help build progress and security for all". Except the Russians and Chinese, of course.

Another interesting point in *Flying*'s preview was its view that "to foreign observers, one of the most fascinating features of the Congress will be general aviation — an element of flight which to date is almost exclusively a major development in the USA" — a statement that may have raised an eyebrow or two on the board of Auster or Jodel. The article continues: "Remember, there are more privately owned aircraft in the state of California alone than all the rest of the world, outside the USA, put together" — a thought-provoking statistic if true.

On Sunday April 12 the international press was allowed its first glimpse of the exhibits at the Convention Center, as the final touches were being added to the sprawling site. *Flight's* Kenneth Owen, who was there on a tour of the

The latest missile technology was put on display in the exhibition area behind the Convention Center and included the jet-propelled Northrop Snark surface-to-surface cruise missile (nearest camera) and the already largely-obsolete Boeing CIM-10 BOMARC rocket-boostered ramjet-propelled surface-to-air missile (standing vertically on mobile platform).



RIGHT "The World's First Manned Space Airplane", says the sign beside the full-size wooden mock-up of the North American X-15, although the type had yet to make a non-captive flight, either as a glider or under its own power.

BELOW The Convair Atlas ICBM (left) and Douglas Thor-Able IRBM are raised from a horizontal to a vertical position in the missile park, as the public address system announces: "There they are — the Free World's two major missiles . . ."





ABOVE Based at Flabob, California, renowned film aviation specialist Frank Tallman brought a small collection of antique aircraft for display in the static exhibition area, including 1918-vintage Pfalz D XII N43C, which was later acquired by the Champlin Fighter Museum in Arizona; it is currently on display at the Museum of Flight in Seattle.

USA's missile sites, commented that "the last few dollars of the six million were being spent as the final pieces of lush carpeting were tacked in place at the entrance to the vast circular auditorium". It soon became apparent that international exhibitors were thin on the ground, with only Rolls-Royce, Napier and Lucas-Rotax from the UK, Canadair from Canada and Dassault from France taking stand space in the main exhibition hall, although after the event it was claimed that officials from 47 countries had attended the WCF.

In the static aircraft and missile park behind the exhibition centre, a collection of rocket-powered missiles spiked the desert air. The largest, a Convair Atlas intercontinental ballistic missile (ICBM), had a door cut into its lower skin, which visitors were invited to enter. According to Kenneth Owen, the "loudspeakers vibrated with enthusiasm", a faceless voice announcing that "You are invited to be among the first people to enter a ballistic missile. We think you will find it interesting . . ." Indeed he did, taking a look around the display of colour photographs presented within the missile's interior. Alongside stood a composite of rejected parts forming a replica Douglas Thor-Able, the intermediate-range ballistic missile (IRBM) then being tested by RAF personnel up the California coast at Vandenburg AFB.

Also in the static park was a Martin TM-76 (MGM-13) Mace tactical cruise missile, Boeing CIM-10 BOMARC surface-to-air missile (SAM) and a Northrop SM-62 Snark surface-to-surface cruise missile. There were also models of a Discoverer satellite and the Project Mercury

capsule, plus the aforementioned wooden mock-up of the X-15. In the shadow of all this high-tech hardware stood examples of advanced technology from a bygone age in the shape of a Sopwith Camel, replica Blériot monoplane and Pfalz D XII biplane, accompanied by Frank Tallman and Nelson Lomis of Tallman Aviation, dressed as members of the Royal Flying Corps and *Fliegertruppe* respectively.

Using the showground beyond the static exhibition area were the numerous light aircraft and helicopters attending the show, the latter using the disused horse-racing track behind the Convention Center for spirited displays, the most notable by a Hiller UH-12. Other whirlybirds present were US Army and civilian examples of the insectoid Hughes 269A, and a Sud-Ouest SO 1221 Djinn and rocket-armed Sud SA.313 Alouette II flying the flag for France. The gliding and sailplane community was also well represented, with demonstrations at the horse-track under the ægis of the Soaring Society of America, which had invited the World Soaring Champion, Ernst-Günter Haase, from Germany.

THE FUTURE OF AIR TRAVEL

With the various symposia and conferences under way in the Convention Center, the afternoon of Monday April 12 saw a short flying display by the civil aircraft at McCarran Field, where a line-up of the USAF's "Century Series" of fighters — North American F-100 Super Sabre, McDonnell F-101 Voodoo, Convair F-102 Delta Dagger, Lockheed F-104 Starfighter, Republic F-105 Thunderchief and Convair F-106 Delta Dart — was also put on view to the public.



ABOVE A USAF Air Policeman makes the most of what little shade can be found on the Nellis ramp beneath one of the three 617 Sqn Vulcan B.1s sent to represent Britain's nuclear capability. Vulcan XH498, seen here in the background, suffered a major mishap in New Zealand six months later; see *A Close Shave at Wellington* in TAH5.

The commercial aircraft gathering included the very latest jetliners, among them Boeing 707 N7506A in American Airlines markings, the fourth production Douglas DC-8 and the third production Convair CV-880. The new generation of turboprops was also on hand in the form of a Lockheed Electra, Fairchild-built Fokker F-27 and a Canadair Napier Eland-engined Convair 540. Painted in the standard V-Force all-white anti-flash scheme, the Avro Vulcans of the RAF's No 617 Sqn turned heads alongside the jetliners, the British nuclear bombers (and a Transport Command de Havilland Comet 2) representing the only visiting air force flying its own national aircraft in its own national markings.

The 707 was the first to take off, departing McCarran 20min before the flying display was scheduled to start; it did not display and did not

return, rather disappointingly. The DC-8 made a noisy departure from the longest runway and flew a single pass over the field, but also did not return. The CV-880 offered more value, making a short take-off from the shorter runway, followed by a series of low-level flypasts with varying percentages of power applied.

Up next was the Electra, which, according to British weekly magazine *The Aeroplane's* photographer, Charles A. Sims, "performed like an accomplished and well proven airliner", Sims ruminating that "this made me think we had missed a wonderful chance to enhance British prestige. Surely it would have been worthwhile to send a Comet 4 or a Britannia to a gathering of this importance. Imagine the effect on the assembly if it had been announced that either or both of these aircraft had left London the day

Using nine temporarily repainted North American F-86F Sabres borrowed from second-line USAF units, the Chinese Nationalist (Taiwanese) Air Force's Thunder Tigers formation aerobatic team performed impressively at the Congress, particularly in view of the fact that most of its members had an average of a mere 20hr on type.





ABOVE The USAF's own four-engined delta-winged nuclear-capable bomber, the Convair B-58 Hustler, was a very different proposition from the RAF's Vulcan, being capable of Mach 2 as against the Vulcan's high-subsonic maximum speed, although the Vulcan was far easier to handle. This is the second prototype XB-58, 55-0661.

before on regular schedule and with a full load of fare-paying passengers, and would be back in London again the day after with another full payload, when most of the aircraft on show at McCarran were just experimental prototypes!"

Although the Vulcans did not display on the Monday, the RAF put up an excellent demonstration of British flying élan in the No 216 Sqn Comet 2, in which Flt Lt W. Somers performed a short take-off, a series of low passes with elegant turns and an impeccable landing, earning considerable applause from the spectators. Other display items included a JATO-equipped Dakota and the prototype McKinnon four-engined G-21C Goose amphibian.

The following day saw the turn of the general aviation attendees to display their wares at the horse-track behind the Convention Center, the latter playing host to the second day of the Jet Age Conference, during which Dr Edward Teller, father of the H-Bomb, announced that scientists would probably be able to confirm Einstein's theory of relativity by means of nuclear explosions high in the atmosphere — which seemed to be Teller's solution to most things.

SHOCK AND AWE

The centrepiece of the WCF was the demonstration of airpower scheduled to take place at the Indian Springs Armament Range on Wednesday April 15, in celebration of the tenth anniversary of the formation of the North Atlantic Treaty Organisation (NATO) on April 4, 1949. A number of crude but adequate stands were erected at a site in the shadow of the Rocky Mountain foothills, although these provided scant shelter from the merciless sun in the

cauldron of the bleached desert basin.

The aircraft scheduled to take part were pre-positioned at Nellis, from where they operated on a time-over-target timing of ±5sec throughout the day, Charles Sims noting that the apron at Nellis held some 400 fighting aircraft at one point. The demonstration was made up largely of American types making full use of the elbow room afforded by the remote desert location, although there were contributions from the Italian Air Force's *Diavoli Rossi* (Red Devils) F-84F formation aerobatic team and the Chinese Nationalist (Taiwanese) Air Force's F-86-equipped Thunder Tigers, invited by dint of the 1955 Sino-American Mutual Defense Treaty.

The Royal Netherlands Air Force also weighed in with a performance from its Dash Four formation aerobatic quartet of borrowed USAF Republic F-84Fs (as were those of the Italian team), despite having suffered a mid-air collision during rehearsals the previous Thursday. Thankfully there were no fatalities, one pilot ejecting, the other bringing his damaged Thunderstreak back for a landing at Nellis.

For more than two and a half hours the audience was treated — or subjected — to a remarkable articulation of airpower of every kind, from touch-and-goes on the scrubby desert floor by a Lockheed C-130 Hercules to a Mach-busting low-level run from a Convair B-58 Hustler, the shockwaves all but bowling over the front row of spectators. Scorching full-throttle runs at 50ft (15m) a mere 150ft (45m) from the crowdline were made by a Voodoo, Delta Dagger, Starfighter and Thunderchief in quick succession, an experience described by Charles Sims as "pretty shattering". A Douglas RB-66



ABOVE The air demonstration element of the World Congress was largely a USAF affair, but the US Navy was represented by its formation aerobatic display team, the Blue Angels, which was in its second year of operations with the Grumman F11F Tiger supersonic carrier fighter. Blue Angel No 5 is seen here on the ramp at Nellis.

Destroyer came hurtling through throwing out photo-flashes by the dozen, illuminating the desert sky in spite of the dazzling midday sun.

Other remarkable demonstrations with live ammunition followed, including the release of a sequence of Falcon missiles from an F-106, a napalm drop by four Super Sabres, another example of which released a salvo of high-velocity aerial rockets (HVARs) at a target on the scrubland below. One of the more extraordinary display items saw an F-100 release a target missile, then despatch a Sidewinder air-to-air missile to destroy it a matter of moments later.

A demonstration of the low-altitude bombing system (LABS) devised for the delivery of a nuclear weapon, in which the strike aircraft climbs vertically and releases its load "over the shoulder" at the top of the climb before pulling on to its back to exit the way it had come, was performed by another F-100, although it seems that this sequence may have been undertaken by an F-105 during the rehearsal on the Sunday.

The heavier hardware was equally impressive, with displays by various bombers and transport aircraft keeping the spectators' hands to their ears, including a demonstration of air-to-air refuelling in which a Boeing B-52 connected with a KC-135 Stratotanker for a flypast, and very low-level high-speed passes by three-aircraft formations of B-52s and B-47s. Arguably the USAF's *pièce de résistance* of the afternoon, however, was the simulation of a high-altitude nuclear strike by a B-52, in which the Stratofortress's bomb doors opened to reveal a single sinister nuclear bomb practice round, which, fitted with a barometric fuze, exploded at

a predetermined height after a long freefall.

Being on home ground, the USAF and US Navy formation aerobatic teams, the Thunderbirds and Blue Angels respectively, were not about to allow their foreign counterparts to steal the show and provided a characteristically vigorous aerial ballet for the tens of thousands of spectators who had made the drive out to the remote location.

With such an awe-inspiring spectacle having been provided by the home nation, the Vulcans of the RAF had a great deal to live up to. Charles Sims described No 617 Sqn's moment in the sun:

"Air Vice-Marshal G.A. Walker and his crews put up a most impressive display. After a series of fast and slow runs, they introduced a novel finish which deservedly won a spontaneous burst of applause. The formation opened up after a low-level flypast of the spectator stands to emphasise the size of the four-engined V-bombers, and then went straightaway into a near-vertical climb. Within seconds they were visible only as tiny white triangles in the deep blue sky. The effect was remarkable."

A RIVAL TO PARIS AND FARNBOROUGH?

The reaction to the WCF from the press and public alike was almost unanimously positive, the only negative comments lamenting the lack of international participation, although *Flight's* Kenneth Owen offered a typically British perspective on the rather more hubristic elements of the event:

"Whether the Congress will succeed in helping to bring the world closer to permanent peace by having people step inside an ICBM, by



simulating the explosion of a nuclear bomb, and by its other and more obviously worthwhile activities, remains to be seen".

Gill Robb Wilson, the highly-respected Editor and Publisher of American magazine *Flying*, stated in his op-ed piece of July 1959 that the WCF should become a regular event, remarking: "It would seem to this writer that the World Congress of Flight, staged perhaps every third year on this side of the Atlantic in alternate staging with Britain's Farnborough and the Paris Air Show in Europe, might well serve not only American aeronautics and astronautics but the entire free world." *Life* magazine devoted five pages to coverage of the WCF, and an hour-long live telecast of the airpower demonstration was broadcast across the entire NBC network, reportedly reaching some 20 million people.

A prospective date of September 13–19, 1962, for the second World Congress of Flight was announced in early 1961, with Las Vegas once again to serve as the epicentre of the event's activities. However, as the USA's free-spending, optimistic 1950s turned the corner into the

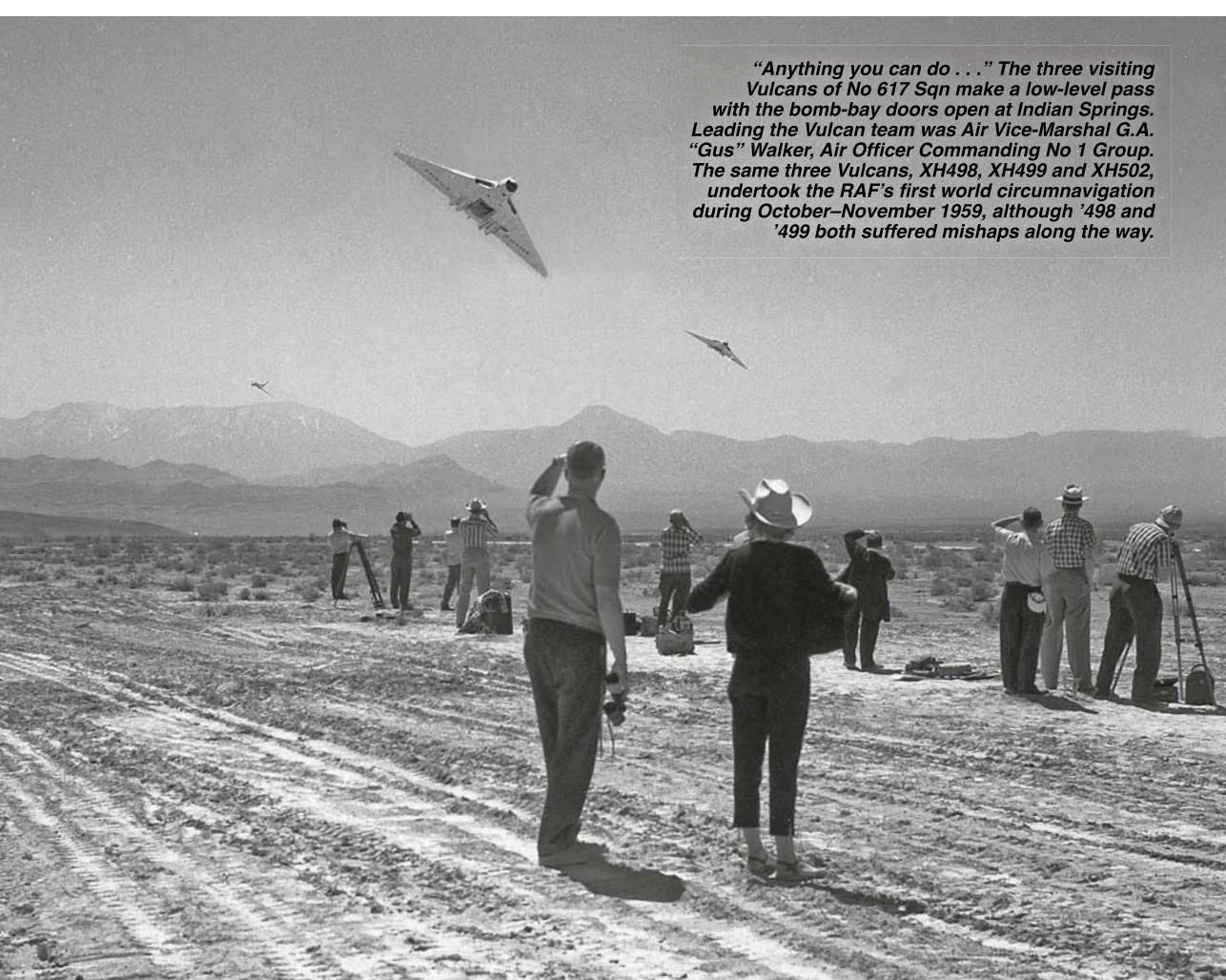
more uncertain 1960s, in which the temperature of the Cold War increasingly fell towards freezing point, and the perception grew that the hardware on show at Las Vegas in 1959 may actually be called into action, the possibility of a repeat performance began to seem less likely.

With John F. Kennedy's election to the Presidency in January 1961, followed a few months later by the disastrous Bay of Pigs débâcle and a steady deterioration in relations with the Soviet Union, the prospect dimmed even further. By the autumn of 1962 Kennedy was on a collision course with his opposite number in the Kremlin, Khrushchev, which would culminate in the Cuban Missile Crisis of October 1962.

Far from practising for another expensive but highly enjoyable aeronautical shindig in Las Vegas, the military forces of the USA were by then preparing their considerable air assets for the real thing. Despite its earnest ambitions to be a force for peace and human advancement, the first World Congress of Flight would prove to be the last.



"Anything you can do . . ." The three visiting Vulcans of No 617 Sqn make a low-level pass with the bomb-bay doors open at Indian Springs. Leading the Vulcan team was Air Vice-Marshal G.A. "Gus" Walker, Air Officer Commanding No 1 Group. The same three Vulcans, XH498, XH499 and XH502, undertook the RAF's first world circumnavigation during October–November 1959, although '498 and '499 both suffered mishaps along the way.





In the first half of a two-part series on flying for British independent airline Skyways Coach-Air Ltd during the late 1960s, former aircrew member **BRIAN TURPIN recalls his initial training after joining the company in 1965. Here he recalls his introduction to the idiosyncratic but much-loved Dakota, and describes what it was like to fly**



IN THE AUTUMN of 1965 I left my job with British United Air Ferries (BUAF) flying Bristol 170 Freighters from Lydd Airport (originally known as Ferryfield and now London Ashford Airport) and moved to the sunlit uplands of the airfield at Lympne, on the escarpment overlooking Romney Marsh in Kent. Here I joined Skyways Coach-Air, part of the British independent airline Skyways of London. The company's coach-air service had been inaugurated between Lympne and Beauvais, to the north of Paris, in the autumn of 1955.

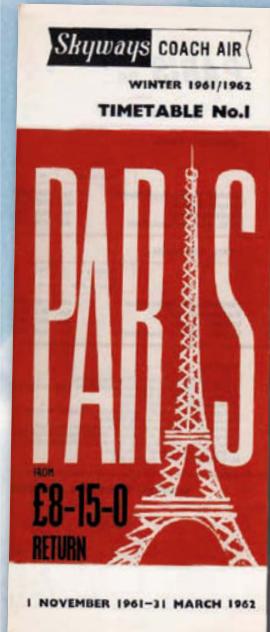
Using 32-seat motor coaches, passengers were taken from Victoria Coach Station in London to Lympne, where they boarded 32-seat Douglas DC-3 Dakotas for the 1hr flight to Beauvais. From there they travelled again by coach to the centre of Paris. The first service had been operated by two Dakotas — G-AMWW and G-ANAE — on September 26, 1955, and the route had proved very popular with the public as a cheap and cheerful, if not very quick, way of travelling between the two cities. So when I joined the company in December 1965 the service was entering its second decade and was still as popular as ever.

THE NEW REGIME

A lot had happened in those first ten years. The airfield had been acquired by Eric Rylands, the company's Managing Director, and new services were started between Lympne and Lyon, Montpellier and Vichy, and charter services

OUT ON A LYMPNE

FLYING FOR SKYWAYS COACH-AIR, 1966-71
PART ONE THE DEPENDABLE DAKOTA



MIKE HOOKS

MAIN PICTURE Built as a C-47B and operated by the RAF as KN492 during 1945-49, Dakota G-AMWW was delivered to Skyways in early 1955 and was one of the first to operate on the company's coach-air services from Lympne, where it is seen here before the formation of Skyways Coach-Air as a separate venture in 1958. OPPOSITE PAGE, TOP The author coming off a flight at Lympne during the summer season in 1966.

With the airfield's trademark abundant planting and white picket fence in the foreground, Skyways aircraft ancient and modern share the ramp at Lympne. Skyways Coach-Air went on to operate a total of eight 748s, an example of which is seen here behind the Dakota, during 1962–71; the author will relate his experiences of the 748 in the next part of the series.

DAVID GOLDSMITH



were operated to numerous other destinations throughout Europe. All these services were operated initially by the fleet of trusty Dakotas until November 2, 1961, when the first of Skyways' new Avro 748s, G-ARMV, arrived at Lympne to begin route-proving trials so that full services could begin the following spring. By the time I arrived at Lympne two 748s were in use, but the Dakotas were still going strong on passenger and freight services and it was on this fleet that I was initially employed.

Compared with BUAF, I found that things were very different at Skyways in many respects, particularly with regard to the company's attitude towards copilots. Whereas on the Bristol Freighter we were looked upon as necessary nuisances, to be tolerated but not encouraged, at Skyways I always felt much more part of a team, working as a crew to get the job done as safely and efficiently as possible. This was particularly apparent in the captains' attitude to the copilots' flying of the aircraft, most trips being flown leg-for-leg alternately by captain and copilot, and emphasised by the fact that copilots flew from the left-hand seat when they were designated as the handling pilot on a sector. This was a great confidence-building practice which encouraged copilots to make critical decisions with regard to the safe conduct of the flight, and was good training for the responsibilities of command.

At that time Lympne was still an all-grass airfield, and in the winter months was not always in the best condition, becoming very wet and boggy, which could seriously degrade take-off and landing performance. We often positioned the aircraft to Ferryfield empty,

the passengers coming down from the hill by coach. Being on top of an escarpment, Lympne was subject to strong winds, severe turbulence and orographic cloud effects which could reduce visibility to nil on the southern side of the airfield in a matter of minutes, often accompanied by 20kt of crosswind, which could make for some exciting arrivals and departures.

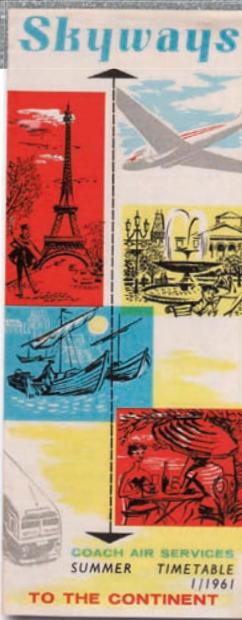
There were regular scheduled night flights, runway lights being provided by a line of goosenecks — oil cans with flaming rags as wicks pushed down their spouts into the oil. Accidentally hitting a gooseneck during the landing run would produce a spectacular display of flame and sparks behind the aircraft, which must have terrified the passengers but never damaged an aircraft to my knowledge.

Initially the only approach aid was a non-directional beacon (NDB), which provided a cloud-break procedure down to 400ft (120m), but later on radar was installed which allowed for PPI/PAR approaches down to a critical height of 250ft (75m). [The two types of radar approach then available were Plan Position Indicator (PPI), which gave the controller the aircraft's position only, and Precision Approach Radar (PAR), in which the controller was able to determine the aircraft's position and altitude on final approach with respect to the desirable glide path — Ed.] Doing a radar talk-down on a dark and stormy night and breaking cloud at 300ft (90m) to see a line of goosenecks flickering in the wind was an experience not to be missed.

On December 1, 1965, I began my conversion training to the DC-3 on G-AMWX, this comprising a series of four take-offs, circuits and

Another magnificent view of Skyways' stalwart Dakota G-AMWW, this time at Beauvais in June 1959. "Whiskey Whiskey" was incorporated into the Skyways Coach-Air fleet when the latter subsidiary was formed on October 9, 1958, although it continued to fly in its "Skyways of London" colours for some time afterwards.

MIKE HOOKS



landings, followed two days later by a couple of practice letdowns using the Dakota's automatic direction-finding (ADF) equipment in concert with the NDB. My training was then interrupted for almost two months, mainly by bad weather and the Christmas holiday period. This was always a busy time for the airlines but as I was not checked out there was nothing useful I could do to help. I spent my time studying the Ops Manual for my Air Registration Board (ARB) exam and enjoyed a full Christmas at home, the last I was to have for six years.

Flight training resumed on February 1, 1966, with more circuits and bumps, this time in G-AMSM. The final session took place on the 3rd, final almost being almost the operative word. Having done one touch-and-go we made a full-stop landing and I taxied the aircraft back for another take-off, while the training captain did the pre-take off checks. During the take-off run I noticed that the aircraft seemed to be way out of trim fore and aft. We were taking off on "Runway" 16, heading towards Lympne Castle. Just after getting airborne, the training captain shut down the starboard engine and feathered the propeller. In those days practice engine failures were not simulated — they were done for real. It was at this point that I realised that something was seriously wrong with the aircraft. Normally, an

empty DC-3 will climb away quite happily on one engine, but on this occasion it was very reluctant to do anything but go downhill. Fortunately, we had 350ft (100m) of escarpment to play with.

We just cleared the castle and then headed for the marsh, with just about enough airspeed for the rudder to be effective against the asymmetric thrust. The training captain's hands began to move in a blur about the cockpit as he restarted the starboard engine. By this time we were at about 100ft (30m) above the ground and I was heading for a large field in which to practise my forced-landing skills. Once both engines were running again at full power we began to gain altitude and it was at this point that the captain discovered his mistake. We had taken off with full flap down.

FLYING THE THREE

Compared to the Bristol Freighter, the Dakota cockpit was very snug. If anything, the instrument and control layout was even more chaotic, and to add to the confusion, all our aircraft cockpits were different in various respects. The only standard arrangements were the two blind-flying panels, the central engine-control pedestal and the overhead panels, which were mainly covered with electrical and engine-starting switches.

All the radio station boxes were mounted



ABOVE Luggage is loaded aboard a Skyways coach at London's Victoria Coach Station. Each coach would carry 32 passengers, the same number of passengers carried on a routine Skyways Coach-Air flight to Beauvais, 57 miles north of Paris.

LEFT Potential customers take a look at the services on offer in the window of the Skyways office at 7 Berkeley Street in London's Mayfair district circa 1958. The company also maintained a Town Terminal in Elizabeth Street, adjacent to Victoria Coach Station.



ABOVE A pair of Leyland Royal Tiger coaches of the East Kent Road Car Company depart Victoria Station with press and dignitaries aboard for the first Skyways coach-air service to Paris on September 21, 1955. The 65-mile (105km) journey to Lympne would usually take a couple of hours, after which the passengers would disembark and briefly stretch their legs before boarding the Dakota.

LEFT Weighing baggage at the terminal at Lympne before the flight to Beauvais. The overall journey time from the centre of London to the Moderne Palace Hotel in Place de la République averaged six hours and initially cost £7 5s 0d – a good 20 per cent less than the Heathrow-based scheduled operators.



ABOVE Passengers aboard a Skyways Coach-Air Dakota in 1958. Although perhaps not the height of luxury, the accommodation in the cabin was comfortable enough, the 1hr hop between Lympne and Beauvais being the shortest single stage of the journey. Standard crew on a coach-air service comprised two pilots and a stewardess.

overhead, controlling two very-high-frequency (VHF) comms, one VHF omnidirectional radar (VOR) receiver, one ADF and an ILS (instrument landing system) receiver. VHF No 1 had 140 channels but VHF No 2 had only 23 pre-selected channels, which meant that before departure you had to check that you had the right channels installed for your intended flight. The Bendix ADF was known as the "coffee grinder" as it had to be tuned in manually with a small handle, which had to be wound round a large number of turns as it slowly altered the frequency. Accurate tuning could be quite difficult to do in conditions of high static interference or moderate turbulence. There were not all that many VOR stations about in the 1960s and the ADF was still a primary navigational aid, particularly in France. Besides, it was needed in the summer to get the latest cricket score.

ALL ABOARD ...

On a typical day the crew would check in to Ops at least 30min before scheduled departure time and we would generally walk out to the aircraft about 15min before take-off. The copilot usually did the external walk round — particularly if it was cold or raining — and then climbed aboard to run through the cockpit checks. After the passengers had boarded and the door had been secured, the stewardess would report to the flight deck the number of passengers "belted and briefed", and that she had five locks, two pins and a pitot cover on board. These were the

elevator, aileron and rudder gust-locks, the two undercarriage safety pins and the pitot-head cover removed by the copilot during the external check, all of which were stowed in a box behind the last passenger seat row by the rear door.

All our DC-3s were fitted with inertia starters that made use of a flywheel, which had to be spun up to turn the engine over. This could also be brought up to speed by means of an external handle which fortunately I never had to use. After the flywheel had been energised for 10–15sec, the mesh switch was selected and the engine would begin to turn over. Priming as necessary, the mixture control was moved to AUTO RICH once the engine was running smoothly. The port engine was usually started first as it was easier to check the hydraulic system pressure that way.

Once both Pratt & Whitney Twin Wasps were rumbling away confidently outside we could taxi out on to the airfield and perform our pre-flight checks, which included the usual magneto checks and exercising the Hamilton Standard constant-speed propellers. The vital actions included: flap- and undercarriage-selector levers set to NEUTRAL; latch lever set to POSITIVE LOCKED; pump-selector lever aft; trimmer set to NEUTRAL; mixture set to AUTO RICH; propeller pitch set to FULLY FINE; cowl gills set to TRAIL; carburettor air COLD; gauges and gyros checked; generators on and charging.

Once in position on the runway the tailwheel lock was engaged, the flying controls were



MIKE HOOKS

checked "full and free" and the throttle-friction nut was tightened.

With take-off clearance received, the handling pilot initially advanced the throttles, as they could be used in a strong crosswind to help keep the aircraft straight during the first part of the take-off run, the into-wind engine being given slightly more power. It was also easier for the handling pilot to get the feel of the aircraft as the power came on if he advanced the throttles. By the time the tail was up and full rudder control established, full power would have been selected. The non-handling pilot would follow up on the throttles and set take-off boost (maximum 48in Hg), check the temperatures and pressures and hold the throttles open. With very little persuasion on the part of the pilot, the Dakota would fly off at about 80kt. Single-engine safety speed was 84kt.

Once safely airborne the handling pilot would signal for the undercarriage to be selected up. Hand signals were used in the early stages of the flight because of the high noise level in the cockpit with take-off power selected. The signal for "undercarriage up" was to raise the right hand, palm upwards.

AIRBORNE!

One of the eccentric features of the DC-3 was its hydraulic system, and in particular the arrangement of the various levers on the hydraulic panel, which was mounted on the cockpit bulkhead, behind and to port of the copilot's seat. The undercarriage selector lever had three positions; DOWN, NEUTRAL and UP. There was also a three-position safety latch lever, the purpose of which was to control the operation of the undercarriage lever and prevent

ABOVE The starboard mainwheel hauls itself into the engine nacelle, its port-side companion already nestled away, as G-AMWW clatters away from Lympne in May 1959. By the time the author joined the company in late 1965 it was operating four Dakotas — G-AGYZ, G-AMSM, G-AMWW and G-AMWX (written off that December) — on coach-air services.

OPPOSITE PAGE A composite of several photographs of the cockpit of Air Atlantique's Dakota G-AMRA, which, as the author explains, "remains pretty much as the Skyways cockpits were — fairly tatty with a lot of old instrumentation; the artificial horizons here are new, unlike ours, which were the same as those fitted to Chipmunks — or indeed Lancasters!"

inadvertent retraction of the undercarriage. To raise the undercarriage, the latch lever had first to be moved to the "latch raised" position and then the undercarriage lever moved to UP. The hydraulics would then slowly raise the undercarriage, the wheel with the most freely-moving jack retracting first.

There were no up-locks, the undercarriage being held up during flight by hydraulic pressure; after the undercarriage lever had been returned to the NEUTRAL position, the latch lever automatically returning to the "spring lock" position. Even when the undercarriage was fully up there was a sufficient amount of the wheels exposed below the nacelles to allow a landing in an emergency with the undercarriage fully retracted. The brakes would also work in this situation. This was successfully achieved on more than one occasion during the Dakota's long history, the only problem being that the propellers tended to get mashed up when they hit the ground. The props also had a nasty habit of breaking off, the port propeller sometimes penetrating the cockpit, often with fatal results.



With the mainwheels tucked away and the aircraft established in the climb at 95kt, the handling pilot raised his index finger to signal the first power reduction and the copilot set 43in Hg manifold pressure and 2,550 r.p.m. At 115kt two fingers indicated the second power reduction to 35in Hg and 2,350 r.p.m. If the aircraft's weight permitted, the climb could be continued with power set at 2,050 r.p.m., the normal cruise setting, with a manifold pressure to suit. Because the aircraft was unpressurised the rate of climb was generally restricted to 500ft/min (150m/min) to save discomfort to the passengers' ears.

The Dakota was very pleasant to fly, the controls being well harmonised and speed stability was good. The elevators were light and very effective, the ailerons moderately effective, becoming heavy with increased speed. The rudder was heavy at all but the lowest speeds and was always very effective. All the control trimmers were sensitive and had a strong action so that they had to be used with care. At a high power setting on one engine, rudder

forces were high, but usually most of the load could be removed with the rudder trimmer. It was recommended that the aircraft should be trimmed into a dive and, in particular, gently trimmed out of a dive because although the elevators were heavy at high speed they were also very effective and coarse use could overstress the aircraft.

In turns, even with less than 15° of bank, the Dak tended to lose height, a tendency which could be counteracted by using elevator trim when entering and completing turns. At the maximum all-up weight of 28,000lb (12,700kg), zero-flap stalling speed was 69kt, and with full flap 60kt. At the maximum landing weight of 26,900lb (12,200kg) both speeds were reduced by only 1kt. Power-off stalls were innocuous.

There was strong tail buffet on the approach to the stall, owing to the airflow breaking down around the engine nacelles. Power-on stalls were a different proposition as they occurred without any advanced buffet warning, and a wing might drop violently to the vertical if the entry was in any way mishandled.

A rare colour photograph of a Skyways Dakota over Otterpool Lane on final approach into Lympne. Until the late 1960s Lympne was a grass-only airfield, which suited the rugged Dakotas, but less so the more refined 748. As a result, a hard runway was built at Lympne in 1967 and opened in 1968.



DAVID GOLDSMITH

Once in the cruise, power would be set to 2,050 r.p.m. with boost set according to the cruise charts and mixture to AUTO LEAN. This gave a fuel flow of 34–42gal/hr per engine and a cruising speed somewhere between 130kt and 140kt, depending on aircraft weight and altitude. As we had no oxygen system, the maximum cruising altitude was restricted to below 10,000ft (3,000m) with passengers on board. Once trimmed out in the cruise the autopilot could be engaged. This was an early-vintage Sperry A3 Hydraulic Gyropilot, which gave very precise control of the aircraft and could be used for climb, descent and turns on to headings. However, there was no height-lock and no altitude alert, so you had to keep an eye on things and not leave everything to "George".

The DC-3 rode turbulence well but we had no weather radar, using instead Mk 1 eyeballs and trying not to fly into anything too dark and sinister, particularly if there was lightning coming out of it. Airframe de-icing consisted of Goodrich inflatable rubber "boots" on the leading edges of the wings outboard of the engines, and tailplane and fin. Propeller de-icing used de-icer fluid distributed along the leading edges of the blades by means of an electric pump. The 3½ gal of fluid would last for about 1hr 15min at the maximum flow rate.

The windscreens were also de-iced with fluid which could be used in conjunction with the variable-speed hydraulically operated windscreen wipers which in heavy rain were

about as effective as those fitted to an Austin Seven. The windscreen tended to leak rather badly in heavy rain, the water running into a sort of gutter over the instrument panel. Once the gutter was full, the water, mixed with discarded cigarette ends and other assorted detritus, would then slop out onto the pilots' knees or clipboard. Drying out was achieved by means of the very efficient cockpit heating, derived from the engine tailpipe exhaust heat exchangers. The passengers were not so lucky as only the first three rows of seats seemed to receive any benefit from the system, even when we were near meltdown on the flightdeck.

APPROACH AND LANDING

The fuel system was typical of this generation of aircraft. There was one main and one auxiliary tank in each wing, giving a total capacity of 670gal (3,045lit). By means of two selector valves, mounted one on each side of the central control console, any tank could feed any engine. The selecting of fuel tanks could sometimes lead to confusion, never more so than on one occasion when a crew changed tanks and were rewarded after a few moments with both engines stopping. In the ensuing silence, hands flashed around the cockpit returning the fuel selector valves to their original positions and the engines were restored to life. Further investigation revealed that both the selector valves had been incorrectly installed in such a way that one of the fuel ON positions on each selector was actually

By the spring of 1966 G-AMWW had been painted in the definitive Skyways Coach-Air colour scheme, which used the same signature colours of pale blue, burgundy and white, but with a revised legend above the cabin windows. The steadfast 'MWW' is seen here at Biggin Hill during a charter operation to provide flights between Beauvais and Biggin Hill for the Air Fair in May 1966.

MIKE HOOKS



OFF; a fine example of "Murphy's law".

At about 2min out from the final approach fix, speed was reduced to 130kt and the undercarriage selected DOWN (maximum speed 139kt). With the landing checks completed, quarter flap was lowered (maximum speed 135kt), mixture to AUTO RICH and prop pitch set to give 2,050 r.p.m. Initial approach was flown at 120kt, reducing to 90kt on final with flaps half down (maximum speed 97kt). In IFR (instrument flight rules) conditions, or at night, propeller pitch was set to 2,550 r.p.m. and, once landing was assured, full flap was lowered and speed reduced to 80kt over the threshold.

A "wheeler" landing was usually made, particularly with a crosswind and a short runway, as it was then possible to put the aircraft down accurately on the touchdown point. Three-point landings were reserved for long runways and light winds, but a good three-pointer was very rewarding and would put a smile on your face for the rest of the day. As soon as the mainwheels touched, the non-handling pilot raised the flaps, set pitch to fully fine and the cowl gills to OPEN. The tail was allowed to come down in its own time and then the control column was held well back and kept there until the engines were shut down.

Flapless landings would be flown at not less than 90kt, but at least 4,500ft (1,400m) of runway was required and these were banned at Lympne except for crew training. Single-engine approaches presented no particular problems,

although if it was necessary to abandon an approach this would always be initiated above 500ft (150m) and the airspeed kept well above the single-engine safety speed of 84kt, normally with 95kt for the climb-out.

With the summer season approaching, the company was now short of aircraft and began looking for additional Dakotas. Westpoint Airways had recently ceased operations and Skyways was able to obtain two of its aircraft, one of which was G-AMDB, which had at one time been fitted with Rolls-Royce Dart turboprop engines and used by British European Airways as part of the Vickers Viscount development programme. Another of our aircraft at that time was G-AMPY, which is still airworthy with Air Atlantique at Coventry.

I was soon sent off to Hawker Siddeley at Woodford for a course on the company's 748, but I continued to fly the Dak until June 1968, when they were all taken off passenger operations and later transferred to the subsidiary company Air Freight. My last DC-3 flight took place on June 16, 1968, by which time I had flown just over 310 very enjoyable hours on type.

NEXT TIME From piston to turboprop — the author describes getting to grips with the Avro/Hawker Siddeley 748 — "a fantastic leap forward . . ."



ACKNOWLEDGMENTS The Editor would like to thank Dick Gilbert, author of Skyways at Lympne — for more information visit www.skylineaviation.co.uk/skyways

STEFAN

THE **KARWOWSKI** FACTOR



To the jaded UK airshow visitor in 1980, the arrival on the scene of a scarlet Hunter flown to the very edges of its flight envelope by a prodigiously gifted pilot determined to wring the last drop of performance from the sleek jet was a revelation. With the help of Stefan Karwowski's friends and former colleagues, **PAUL FIDDIAN** profiles a high-octane life in aviation





SCINTILLATING IN its presentation, the debut of Spencer Flack's striking scarlet Hawker Hunter F.51, G-HUNT, was a compelling highlight of 1980's Biggin Hill International Air Fair that May. Significant in launching on to the UK airshow circuit its first privately-owned jet fighter, it was a textbook example of the exhilarating flying style brought to the display scene by the late Stefan Karwowski. In the dashing Hunter lay the perfect mount for Stefan's exuberant airshow routines but, during a lifetime cut tragically short, many other types also found their way into his logbook, notably the Grumman Bearcat and Folland Gnat.

Staged in five successive British summers' skies, Karwowski's virtuoso displays were the product of an intensely varied flying career, assimilated from a multitude of experiences, including service with four air arms. Among many British enthusiasts, these displays still provoke a deep sense of awe today, and many of that era's foremost airshow performers recall Stefan's defining characteristics and the weighty contribution he made to a vibrant period in UK airshow history. Such contemporaries include Stephen Grey — then just starting to establish what would become The Fighter Collection — and Adrian Gjertsen, at that time spearheading, alongside Stefan, the first generation of classic-jet display pilots.

IN THE BLOOD

Stefan Witold Karwowski arrived in the world on June 4, 1945. He was born into a family with an already-solid aviation heritage; his Polish father, Włodzimierz Eugeniusz Karwowski, had flown with France's *Armée de l'Air* and the RAF during the Second World War, latterly as a flight commander, while Pamela, his English mother, had been a Women's Auxiliary Air Force (WAAF) cipher-operator.

Stefan's earliest years were spent in Middlesex but in February 1948 the Karwowskis moved to New Zealand, ultimately settling in Whangarei, the country's northernmost city. In leaving the UK, Stefan's father left behind his flying career and took up farming. For Stefan, no such path lay ahead. A keen athlete, he may have become a professional sportsman — but it was in aviation that he would find his true calling.

According to the memoirs he would later write, Stefan became interested in the concept of flight when aged six and shortly afterwards experienced it first-hand in a New Zealand

National Airways Corporation de Havilland D.H.89B Dominie. He joined the local Air Training Corps squadron, built and flew large-scale models and then, aged 18, applied to join the Royal New Zealand Air Force (RNZAF). In November 1963 this first application was rejected on account of his medical examination results, these revealing both a "periodic rapid pulse rate" and "sensitivity to light". The following month an RNZAF medical consultant reassessed the report and suggested that this decision be overturned. Consequently, on January 7, 1964, Stefan joined the RNZAF. On July 26 the same year, however, after 10½hr spent flying North American Harvards at Wigram, his RNZAF career ended when he won an RAF jet-flying scholarship and promptly moved back to the UK.

During his six months with the RNZAF Stefan had impressed his superiors, eliciting from them deep praise in his End of Course Report:

"Karwowski grasped principles and techniques quickly and thoroughly; after an initial demonstration of each exercise, little prompting was necessary", the report stated.

"By the end [of the course] he was flying smoothly, confidently and accurately and was making rapid progress towards solo standard in the circuit. His general air sense is outstanding and he was criticising and correcting his own flying largely unaided".

INTO THE RAF

Stefan's rise through the RAF's ranks was no less rapid. Honing his craft on Hunting Jet Provosts and Gnats, he became especially proficient in both solo and formation aerobatics, and by July 1966 had acquired the rank of Flying Officer. Soon after, he was posted to No 208 Sqn, at that time stationed at Muharraq in Bahrain. For 2½ years he flew Hunter FGA.9s on penetrating ground-attack sorties over the local terrain.

Stefan's next posting reunited him with the docile but solid Jet Provost, this time in an instructing role, before a second overseas deployment prospect presented itself. This, his most exciting assignment yet, saw him spend three years in No 140 "Osprey" Sqn of the Singapore Air Defence Command (Republic of Singapore Air Force from 1975). In a role that neatly stitched together several elements of Stefan's already extensive flying career, he taught No 140 Sqn's pilots the art of aerobatics. In 1973 he helped establish the air arm's first aerobatic team — Osprey Red — with Hunters.

OPPOSITE PAGE, TOP Stefan Karwowski in the seat of Hunter G-HUNT during his relatively short but extremely memorable tenure as its chief pilot during 1980–82. **OPPOSITE PAGE, BOTTOM** Stefan brings the scarlet-painted G-HUNT in to land after another typically spine-cracking display at RNAS Yeovilton's Air Day in August 1980.



DEBBIE GARY COLLECTION x 2

ABOVE The original incarnation of the four-aircraft Carling Red Caps aerobatic team in 1974. From left to right: Bill Loverseed (team leader); Mike O'Hanlon (right wing and Stefan's room-mate); Karwowski (left wing, also seen at RIGHT); Debbie Gary (slot and first woman pilot of a full-time professional aerobatic team) and team manager/torry pilot/commentator Nick Daniel.

From Singapore, Stefan moved to Canada in 1974, having transferred to the RAF Reserves. It was in Canada that Karwowski met up with Michael "Manx" Kelly, who, in 1970, had founded the Rothmans Aerobatic Team, the world's first full-time civilian display unit. In a bid to replicate the team's success in Europe, Kelly established an equivalent Canadian team — the Carling Red Caps — with a fleet of Pitts S-2As as used by the Rothmans team since 1973. To the already-multinational line-up of British pilot Bill Loverseed (initially team leader before Manx took his place), Mike O'Hanlon (Canadian) and Debbie Gary (American), Stefan's addition proved a popular move. As Debbie explained to the author, "the girls loved his New Zealand accent and were often nice to me just to get a chance to meet him! I thought we were an awesome team, always thinking up and trying new manœuvres and combinations and trying to be the best out there. We were all evenly matched in skills and drive and had a wonderful time flying together."

Humour was another vital part of the team's *esprit de corps*, Debbie explaining that "Stefan was the object of many of my pranks and he made fun of me whenever he could", as was



Stefan's sense of visual flair. "We all had assigned duties, so Stef was in charge of our team clothes. He was the only one of us with any sense of style; he designed our red leather team jackets and picked out the things we wore."

The Carling Red Caps team lasted just long enough to complete the 1974 season, flying more than 70 displays, all much appreciated by Canadian spectators. However, despite the team's popularity, Stefan appeared to tire of it. Debbie recalls one particular late season rehearsal that he missed, a strong indication that "he was restless and maybe ready to move on." The team, she adds, was temporarily "the perfect vehicle for him, but I think at the end Stef was



just ready for more freedom and stimulation. Being on a team means minding the boss and conforming to the team rules — and Stef was no conformist. He was fickle, easily bored, loved variety and was always looking for the next challenge and thrill."

His formation team days over, he was soon to find that next challenge. Following his stint with the Carling team, Stefan rejected the prospect of a commercial aviation position in New Zealand and returned to operational military flying on Hunters and Sepecat Jaguar GR.1s (from 1974). In 1975 another RAF secondment saw Stefan posted to the Sultan of Oman's Air Force (Royal Air Force of Oman from 1990), then operating Hunters and BAC Strikemasters. Surveyed from typically low altitude, the blurred rush of Oman's desert stretches streaked below Stefan throughout much of 1975. On one occasion he experienced engine failure, and on another a surface-to-air missile strike shattered his jet's windscreens. As a result he was awarded the Sultan's Gold Cross, which he later received special permission to wear on his RAF uniform.

CIVVY STREET

In January 1976 Stefan's service career drew to a close and he retired with the rank of Flight Lieutenant. New adventures loomed. Back in the UK Stefan's pursuit of aviation took a somewhat less-high-octane turn with his leasing-out of Airmore International's pre-flown Beechcraft King Airs at Elstree. But it was at the Hertfordshire airfield that Stefan's career would be

ABOVE Adrian Gjertsen at the controls of G-HUNT during the Hunter's display at RAF Valley on August 15, 1981. Built at Kingston as an F.51, G-HUNT originally served as E-418 with the Royal Danish Air Force from June 1956 until 1975. Spencer Flack acquired it minus its powerplant in 1978, obtaining an Avon engine from an Air Training Corps unit in Balham.

reignited when, on March 20, 1980, he took Spencer Flack's Hunter F.51, G-HUNT, aloft for its first post-restoration flight.

For the next 18 months Karwowski was the Hunter's principal display pilot, his thrilling performances showcasing his impeccable sense of choreography and flair in the low-level arena, effortlessly blending the flying skills he had amalgamated in Singapore, Canada and Oman. Following its Biggin Hill Air Fair debut, the scarlet Hunter quickly became a highly desirable airshow asset and, to cope with the demand, the services of a second pilot, Adrian Gjertsen, were quickly secured. Adrian refers to Stefan as "a naturally very talented pilot, who displayed aeroplanes close to their limits — and what I imagine was close to his limits, too". He recalls:

"Stefan's displays were always extraordinary and great to watch. The manoeuvres he used were pretty much what you'd see in a lot of displays, but one of the things that was always exciting was the height at which Stefan finished them — probably the lowest and fastest I've ever seen any aeroplane flown".

In August 1981 Flack suffered engine failure in his Hawker Sea Fury FB.11, G-FURY, near RAF Waddington and had to make a forced landing,

The dynamic duo — G-HUNT and Flack's Spitfire FR.XIV G-FIRE perform a scorching high-speed run at the Biggin Hill Air Fair in May 1981. In its obituary, Flight International described Karwowski as having "a responsible attitude to display flying [which] was exciting but never reckless". MIKE STROUD / TAH ARCHIVE



RIGHT Stefan was not only confined to flying the Hunter for Flack's "Elstree Air Force"; he frequently displayed G-FIRE too and is seen here in the Spitfire's cockpit at Yeovilton in August 1981. Karwowski never forgot that his chief job was to entertain, and always made the effort to connect with his audience.

during which the aircraft was destroyed. The following month Flack decided to sell off G-HUNT and his Supermarine Spitfire FR.XIV G-FIRE, both having been regularly flown by Stefan. The Hunter's new owner was the late Mike Carlton, who went on to establish the Hunter One organisation and take the UK's classic-jet movement to a new level. There ended Stefan's association with G-HUNT as, according to Adrian, he and Carlton simply didn't get on:

"I'd say he had a habit of falling out with the people who owned the aeroplanes. He and Mike didn't see eye-to-eye on quite a number of things, so Stefan never actually flew the aeroplane for him".

"FLY LIKE A HOOLIGAN . . ."

Undeterred, Stefan moved on to pastures new, and into the employment of Stephen Grey, who, by early 1982, had started to build his warbird collection at Geneva around North American P-51D 44-73149, *Candyman/Moose*, which he had acquired in May 1980. The 1982 Biggin Hill Air Fair was the UK launchpad for Grey's newly-obtained Grumman F8F-2P Bearcat N700HL, and Stefan's dazzling performance in the pugnacious yet supremely agile little naval fighter certainly drew attention to the arrival of a new kid on the block.

Remarkably, Stefan had spent very little time in the Bearcat before its public debut and only stepped in when Grey, who was due to fly it, became unavailable. "In front of a big crowd, it was his first display on type and it was



ADRIAN BALCH

absolutely stunning", recalls Adrian Gjertsen.

Stephen Grey remembers his former employee's exceptional piloting abilities — and the impact such high-energy routines had on the aircraft he flew: "There's no doubt that he shook up the airshow scene doing what he did. Stef was an exceptional pilot and an exceptional person but he always wanted to get the best out of an aeroplane. After a few flights with us, we had to educate him to give a little more respect to the kind of engineering that was around in the 1940s, rather than the 1960s and 1970s.

"Stef definitely had something to prove but I don't know what it was. I think it was just natural in him: you're in a machine, you put the pedal to the floor and you make sure it stays on the track. That's one way of going about it and no doubt, if we'd been at war with dispensable machinery, I would have very much liked to have Stef alongside me and not on the other side!"

"He was a nice person to be with; extremely intelligent and a very professional pilot. We had our ups and downs but always in a positive sense. Sometimes he just wouldn't listen — exceptional people can be like that! If he'd taken the opportunity to be a bit more knowledgeable

By the summer of 1982 Stefan had found a new outlet for his audacious displays in the form of Stephen Grey's potent Grumman F8F Bearcat, in which he is seen here in June of that year. In an interview with the Sunday Telegraph in July 1981, Karwowski explained that "a modern warbird is a highly stressed aeroplane, put together without any fat . . . comparing it with a civilian aircraft is like comparing a taxi with a racing car".

MIKE HOOKS



about the aeroplanes and a little more respectful, I think he'd have been a better man."

Stephen suggests that Stefan's flying style was probably better suited to the Hunter and the Gnat, types a generation or two on from the Bearcat, with higher airframe limits and aerodynamic features simply not present in World War Two-era technology. "He was a wonderful jet warbird pilot", he explains. "An exceptional Gnat driver and, of course, the Gnat could handle the throttle being all the way up.

"He was also a brilliant Hunter pilot; he could fly it like nobody I'd seen before. I'd flown a Hunter or two and thought I knew my way around them but he was extremely experienced and I think was able to advance his knowledge of them — and how you could fly them like a hooligan — as a result of being in Oman."

A TRAGIC END TO A FINE CAREER

On July 31, 1982, G-GNAT made its public debut at RNAS Yeovilton's Air Day, with Stefan delivering another outstanding performance. Two months later a very soggy West Malling hosted the inaugural Great Warbirds Air Display, at which Stefan, this time in the Bearcat, dazzled yet again. Future editions of this show would include an award that bore his name, presented to the best individual warbird display pilot.

In 1984, as the UK warbird movement gathered pace, the first Fighter Meet was inaugurated at North Weald. Stefan's G-GNAT solo won great acclaim, not least from the aviation press, which, while accustomed to his flying style, nonetheless

singled out his sparkling routine as a particularly special moment. This was one of Stefan's last UK displays as, by the following spring, he was back in New Zealand.

On April 25, 1985, he took off in Pitts S-1E ZK-ECO for a flight that would ultimately end in the worst possible way. Stefan was extremely familiar with the Pitts, having flown it extensively with the Carling Red Caps. Stephen Grey recalls: "I flew a Pitts with Stef once and his view was that it was an easy aeroplane; you could spin for as long as you like and you could stop it immediately, which is almost true.

"However, it is also a very small aeroplane, making small changes quite dramatic. I think that's what might have caught him in the end."

Started at an estimated 3,000ft (900m) altitude, Stefan's spinning manoeuvre ultimately proved unrecoverable as, at a site close to Wanaka, the aircraft met the ground. He initially survived the crash, but died two days later in hospital in Christchurch. Tributes flowed in, and a missing-man formation was flown for Stefan at that year's Great Warbirds Air Display.

So, what is this extraordinary aviator's legacy? Both G-HUNT and G-GNAT have long since been sold abroad, and only two airshow performers flown by Stefan still grace the UK's skies: the Bearcat and P-51D Candyman/Moose, the latter having been acquired by the Old Flying Machine Company in 1991 and now painted in new colours as *Ferocious Frankie*. Further afield, the Royal Singapore Air Force's modern-day Black Knights team exists as the polished



ABOVE: MICHAEL O'LEARY BELOW: P. BOYDEN VIA AUTHOR

ABOVE Stefan loved to fly high-performance vintage warbirds like the Bearcat, but placed high demands on them, a fact not always appreciated by their owners. The famous BBC presenter Raymond Baxter described Stefan, seen **BELLOW** at Elstree, as "a virtuoso in his field; he was to aerobatic flying what Yehudi Menuhin is to music . . ."

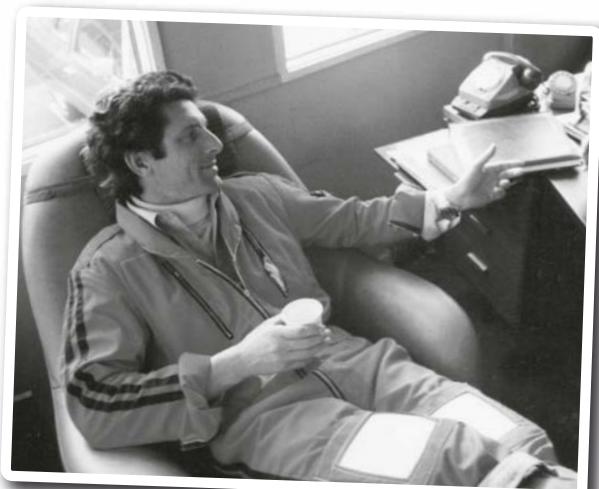
successor to the team Stefan helped to establish.

In terms of display style, Stefan's uninhibited solo flying techniques are almost impossible to replicate in the 21st Century, such are the rigorous (albeit essential) restrictions placed on UK display flying since the advent of the CAA's CAP 403 regulations in the late 1980s. Pushing both his and his mounts' capabilities to their limits, Stefan could spear about the sky virtually unhampered in somewhat less restricted times. In the wake of the tragic Hunter crash at Shoreham in 2015, the CAA's classic-jet display limitations and total Hunter ban have seen an even tighter regulatory backdrop prevail.

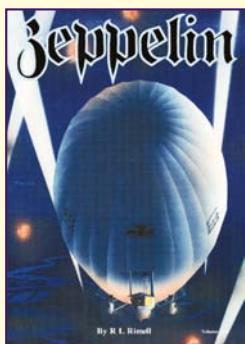
"I sometimes wonder whether he would have found display flying these days as exhilarating as he did back then", concludes Adrian Gjertsen. "He liked the freedom to do what he wanted with the aeroplane . . . you wouldn't be able to do that these days. That doesn't mean the displays would be any less entertaining but, certainly, today's rules and regulations would not permit him to fly an aeroplane to those limits anymore. I'm sure he'd still be flying now, though."

Stefan would surely have enjoyed the state of today's classic-jet scene, its array of types much expanded from those first few types present at the movement's genesis. It is also worth remembering that, much like the

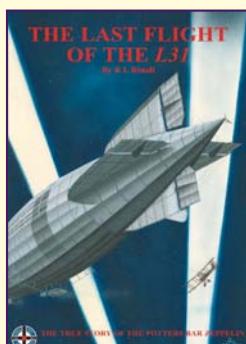
machinery he displayed, Stefan was, in Stephen Grey's words, "a fish out of water". Neither was truly intended for the environment in which they found themselves: Bearcats and Hunters had been developed as fighting machines, and Stefan had been trained to bring the best out of them in a military context. Nevertheless, even if only for a short period, the combination of this remarkably gifted pilot and these potent aircraft set the benchmark for display flying for years to come.



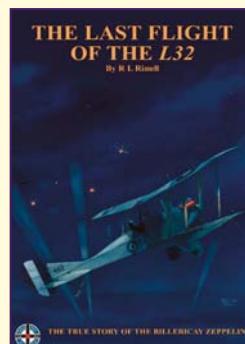
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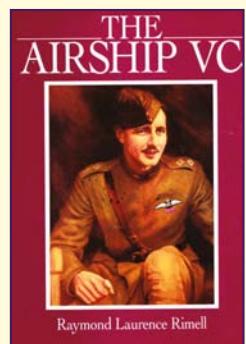
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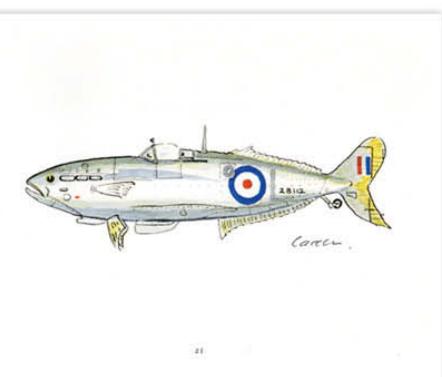
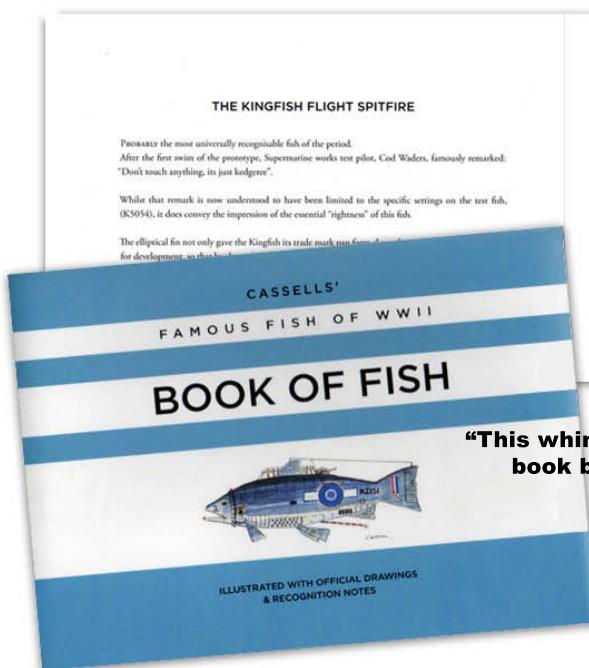


Raymond Laurence Rimell

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One of the ten former Luftwaffe Junkers Ju 52/3ms operated briefly by British European Airways on UK passenger services trundles along the taxiway at Belfast's Nutts Corner airport in March 1947. Although the trimotors were popular with their crews, keeping them airworthy presented too great a challenge and they remained in service for a mere nine months. Note that the No 2 (nose-mounted) engine has been shut down to minimise wear and tear on the fragile BMW powerplants.



TO BELFAST BY JUPITER!

A large, stylized red graphic element consisting of several parallel horizontal bars of varying lengths, creating a shape reminiscent of both a key and an arrow pointing upwards and to the right.

The John Stroud Archive

One of Britain's most respected aviation journalists and authors, John Stroud (born April 3, 1919) joined Imperial Airways aged 14. Six years later he became a freelance aviation writer and in 1963 was appointed General Editor of the definitive Putnam series of aeronautical books. Also a talented photographer, John continued to contribute articles to the British aviation press until his death in March 2007. In 2014 a substantial part of John's archive, including numerous rolls of previously unseen 35mm film, was acquired by A Flying History Ltd and forms the basis of this regular TAH series

John Stroud at the controls of Ju 52/3m G-AHOF during the inaugural flight of BEA's non-stop service from Croydon to Nutts Corner on March 20, 1947. Flying at an average speed of 125 m.p.h. (200km/h), the trimotor would usually take around 2½–3hr to complete the journey. It would then be turned around within an hour or two for the return leg to Croydon.



In early 1947 the newly-formed British European Airways inaugurated a non-stop service between Croydon and Belfast using a creaking fleet of ex-Luftwaffe Junkers Ju 52/3m trimotors. Boarding the service in London was John Stroud, whose right to say he had flown the service to the Northern Irish capital carried rather more weight than most . . .

ON THE MORNING of Thursday, March 20, 1947, Junkers Ju 52/3m G-AHOF lifted off from an overcast Croydon on the first non-stop service to Belfast operated by British European Airways — the recently-minted nationalised conglomeration of private operators that had provided domestic air transport services both before and during the Second World War. On hand to report on the proceedings — and take the controls for a considerable portion of the flight — was intrepid British aviation reporter John Stroud [no relation! — Ed.], whose photographs of the occasion, most of which are previously unpublished, we present here. The ex-Luftwaffe trimotor transports, dubbed Jupiters in BEA service, didn't last long with the new corporation and had been replaced

within a few months — so how had the ageing trimotors come to be in service with the brand-new airline in the first place?

POST-WAR NATIONALISATION

With the war drawing to a close by early 1945, the British Government concluded that, with the remarkable technological advancements in aircraft design and performance achieved during the war years, it was time to start considering the future of commercial air transport. With the war won, a new system of organisation and operation would quickly become a matter of urgency, and it was with this aim in mind that the Ministry of Civil Aviation (MCA) was set up in October 1944, with the Right Honourable Viscount Swinton as its first Minister. Swinton presented the blueprint of



ABOVE With a typically soggy backdrop, G-AHOF sits on the ramp at Nutts Corner awaiting its return flight to Croydon. Phil Butler's invaluable War Prizes states that this Ju 52/3mg8e arrived at the Enemy Aircraft Servicing & Storage Unit in Hamburg in January 1946, before being sold on to Short Bros in March for passenger conversion.

his plans for the future of air transport to the Churchill government in January 1945, in which he envisaged the establishment of a number of organisations run along the lines of mixed ownership — essentially a compromise between unrestricted private enterprise and a state-owned monopoly.

The "Swinton Plan" appeared as a White Paper two months later, its central premise being the establishment of three "chosen instruments" to fulfil Britain's air transport needs. The first would be the continuation of the British Overseas Airways Corporation (BOAC) — formed in November 1939 as Britain's official "flag-carrier" with the merger of Imperial Airways and British Airways Ltd — as a fully state-owned enterprise dealing with long-haul international routes. The two new corporations — British European Airways (BEA) and British South American Airways (BSAA) — would be responsible for domestic and short-haul

international routes and operations in South America respectively.

Swinton's White Paper foresaw BEA and BSAA operating by means of mixed ownership, the majority shareholders being private concerns, these in the case of BEA being mainly the railway companies which had invested heavily in aviation since the 1920s, and which had done much to maintain air transport facilities throughout the UK during the war; BSAA's majority shareholders would be the large shipping companies which had done much the same for South American operations.

Some of the routes operated by the new corporations would be inherently unprofitable, but the attractive *quid pro quo* would be a monopoly on the highly profitable routes. Instead of direct subsidy, it was hoped that this "cross-subsidisation" would lead to the maintaining of services that were in the public interest, which would otherwise have been

British European Airways staff gather beside G-AHOF on the day of the inaugural non-stop London—Belfast service. The colour scheme was natural metal overall with the name of the airline in red and the BEA "speedkey" logo reversed out within a red circle on the fin. On other examples, the logo was red and not contained in a circle.





ABOVE At Belfast John was given free rein to photograph the aircraft, this study highlighting the somewhat weary trimotor's distinctive corrugated skin and Doppelflügel (double-wing) arrangement, in which the control surfaces ran along the trailing edge of the whole wing, well separated from it and operated by a series of cranks and levers.

dropped by a purely commercial organisation.

The White Paper was debated at length during the spring of 1945; but, before any of it could be adopted, the UK's general election of July 5 saw the Conservatives removed from power and a new Labour government intent on radical reform installed in its place. By November that year the new government had drafted its own plans for the future of civil air transport. Perhaps surprisingly, the essentials were the same; three corporations divided as per the Swinton Plan, the main difference being that the mixed ownership model was rebalanced, with the private interests reduced to minority holdings.

The general view from the Labour back benches, however, was that all private capital should be removed from the equation, and the Cabinet announced that the new corporations would be formed as completely nationalised entities, with the state providing the subsidies that would be needed to develop the modern aircraft required to provide a world-class service for the brave new post-war era. The Civil Aviation Act of 1946 was accordingly passed on August 1 that year, and preparations were put in place to establish the new European and South American corporations.

BEA INTO BUSINESS

The apparent losers in the new deal were the railway companies which had provided sterling domestic services before and during the war. Railway Air Services (RAS, formed in 1934 as a conglomeration of the "big four" railway

companies — London, Midland & Scottish; London & North Eastern; Great Western, and Southern) felt particularly aggrieved by the prospect of nationalisation. Indeed, RAS had been lobbying hard since 1944 with proposals for post-war operations which included the formation of a new company in partnership with other air and shipping companies for European services, with full interchangeability of tickets with other forms of transport. It was to no avail, however, and RAS had no alternative but to settle for a compensation payment of £550,000, despite having invested at least double that amount in developing air transport services in the UK over the previous decade.

Initially supplied with 21 Douglas Dakotas from the BOAC fleet, BEA officially came into being on August 1, 1946, when one of the Daks operated the new corporation's inaugural service from Northolt to Athens via Marseille and Rome. Vickers Vikings joined the fleet the following month, G-AHOP making the type's first BEA flight, to Copenhagen, on September 1. An acute shortage of spares for the BEA Dakotas, however, in combination with wing-icing issues with the Vikings, which saw the latter withdrawn from service for modification, led to a chronic shortage of aircraft for the new carrier, and a search for suitable aircraft to step into the breach was put in place.

Surely the simplest answer, given that BEA was a government organisation, would be to transfer some of the 1,900-plus C-47/Dakotas supplied to the RAF during the war to BEA?



ABOVE The Ju 52/3m was no stranger to operations in the UK, three examples – G-AERU, G-AERX and G-AFAP – having been operated by British Airways before the Second World War. This example, G-AERU, was named Juno; its sister aircraft, G-AERX, was named Jupiter, which would become the type's class name in BEA service.

They would have been relatively easy to convert for passenger use and were more than capable of operating BEA's short-haul routes. They were, however, subject to Lend-Lease arrangements, under which America had supplied war materiel to Britain on the understanding that at the end of hostilities it had to be paid for with dollars if it was kept, or returned to the USA. Having exhausted its dollar reserves back in 1940, the British government was in no position to purchase such equipment, so a cheaper, readily-available alternative would have to be found.

ENTER "TANTE JU"

Before the establishment of BEA, RAS had operated as part of the wartime Associated Airways Joint Committee (AAJC), which in July 1945 had organised a demonstration of captured German aircraft at Farnborough, including the four-engined Focke-Wulf Fw 200, twin-engined Siebel Si 204 and stalwart of the Luftwaffe's transport squadrons, the three-engined Junkers Ju 52/3m. Despite its age and lack of refinement, the latter impressed the RAS representative, Wg Cdr A.H. Measures, who recommended that RAS acquire a number of the former Luftwaffe machines for use on RAS domestic services.

A request for six Ju 52/3ms was accordingly put to the MCA, which arranged for 40 examples to be flown to the UK, 30 of which would be

converted for commercial use, the remaining ten to be broken up for spares. As a result, a special RAF unit, the Enemy Aircraft Servicing & Storage Unit (EASSU) was established at Fuhlsbüttel in Hamburg as a holding point for all Ju 52/3ms that were available for transfer to the UK. After the trimotors had been made airworthy, they would then be flown to RAF Brize Norton in Oxfordshire, where they would be stored pending onward allocation or cannibalisation. Once all the airframes had been assessed, Short Bros & Harland in Belfast was then issued a contract to convert ten of the trimotors to a civilian configuration for RAS. A contract was also issued to Field Consolidated Aircraft Services Ltd to undertake the overhaul of the numerous BMW 132Z nine-cylinder air-cooled radial engines required to maintain operations with the German transport.

The first two Ju 52/3ms to be allocated for civilian use were serials VM908 (WNR 6750 in Luftwaffe service) and VM970 (WNR 5096, RK+AV), the former becoming G-AHBP with RAS after overhaul at Speke in August 1946, the latter flying on to Short Bros at Sydenham, Belfast, for a thorough engineering assessment. It was decided that the Ju 52/3ms would be converted to a 12-passenger configuration with a lavatory at the rear and a freight compartment for 33lb (15kg) of baggage per passenger.



ABOVE Three of John's snapshots taken aboard G-AHOF during the London—Belfast—London flight on March 20, 1947. Clockwise from top left: the view from the left-hand seat; the navigator/wireless operator at his station aft of the cockpit; Captain Derek Yapp, who served with BEA from 1945 until 1974, in the trimotor's right-hand seat.

The only Ju 52/3m to be painted in RAS colours, G-AHBP was issued a restricted Certificate of Airworthiness (CoA), essentially only for non-passenger-carrying training purposes, on October 7, 1946. Three days later, after several arduous months of technical problem-solving and spares-searching, the type was awarded a Design Certificate, which allowed a full CoA to be issued on October 17, 1946. Meanwhile, the first production conversion Ju 52/3m, G-AHOC (VM923, formerly WNr 501441), had made its first post-modification test flight on September 19, by which time it had been decided that the trimotors were to be designated as BEA's Jupiter-class, in honour of Ju 52/3m G-AERX *Jupiter*, operated by British Airways before the war. The aircraft were to be painted silver with a blue cheatline, but in the event the latter was deleted and the minimal markings were applied in BEA's signature red.

Although BEA had been established in August 1946, RAS continued to operate services on its behalf, and on November 18 that year RAS undertook the first BEA Jupiter scheduled service, with the opening of the London (Croydon)—Liverpool (Speke)—Belfast (Sydenham) service, flown once daily in each direction except on Sundays. By this time, three examples had been delivered from Short Bros — G-AHOC, 'HOE and 'HOG — all of which

flew the London—Belfast service, operations transferring from Sydenham to the more suitable Nutts Corner from December 16, 1946.

The reins were finally handed over to BEA on February 1, 1947, when the new corporation officially took over the aircraft, services and staff of the AAJC, by which time three more Junkers — G-AHOF, 'HOK and 'HOL — had been delivered, with the remaining four arriving within a few weeks. These were quickly put into service, mainly on BEA's Scottish Division routes, one example being tasked with dropping supplies to the marooned keepers of the remote Dubh Artach lighthouse off the west coast of Scotland during the harsh winter of 1946–47.

BELFAST AND BACK

Thus it was that John Stroud presented himself at Croydon for the inaugural non-stop Jupiter service from Croydon to Nutts Corner on the morning of March 20, 1947. Crewed by Capts Moynihan and Yapp, Ju 52/3mg8e G-AHOF (formerly serialled VN723) set off from a dull, overcast Croydon on the 350-mile (560km) flight, with John aboard, at 0936hr.

The winter of 1946–47 was an unusually bitter one, and March was blighted by continuing wintry snow showers and strong gales. Nevertheless, with the trimotor settled into the cruise at 4,100ft (1,250m) at a speed of 125



ABOVE A view of Nutts Corner from a port-side window of G-AHOF, with G-AHOE on the ramp below. The airport was constructed as a military airfield during 1940–41, and was declared fully operational in September 1941, becoming an important base for wartime RAF Coastal Command operations and transatlantic ferrying services.

m.p.h. (200km/h), John was invited to take the left-hand seat in the cockpit, from which he flew the German transport for 1hr 25min. Having handed back the controls to Capt Moynihan, John returned to the passenger cabin, and after 2hr 51min aloft, the trimotor settled on to the typically wet runway at Nutts Corner.

Located nine miles (15km) north-west of Belfast city centre and three miles (5km) from the shore of Lough Neagh, the former RAF airfield at Nutts Corner had only been open as a civil airport since December 1946. In the first of a 1947 series of reports on the airports under the control of the MCA, British aviation weekly *Flight* noted that the weather at Belfast, "although invariably wet, seldom clamps down completely, and there is usually a sufficiently high ceiling to allow descent through cloud over the Lough and a visual approach to be made". It continues: "Rapides flying into Belfast do a normal QGH [radio-assisted approach] in these conditions, as they are not fitted with SBA [standard beam-approach equipment]". Neither were the Jupiters, of course, although the airport was equipped for SBA approaches.

Nutts Corner's main east–west runway ran to some 6,000ft (1,830m), with two smaller runways of 4,800ft (1,460m) and 3,750ft (1,145m) oriented north-east/south-west and south-east/north-west respectively. The airfield's former RAF buildings were ingeniously converted into a terminal, and special taxiing tracks with lighting controlled in sections from the tower were built. These tracks allowed the aircraft to follow various combinations of routes to reach

the terminal, making night operations safer and more efficient. The *Flight* report also noted that although its flying facilities were excellent, Nutts Corner's accommodation "is quite inadequate", explaining that there were plans afoot to expand those areas. Roy Pearl, the author of the report, remarked that "all the buildings used by the Ministry and BEA have been painted white with red roofs, and one's first impression is rather that of a National Fire Service headquarters, especially with the three bright-red fire tenders and three ambulances beside the control tower".

Having taken a spot of lunch at the airfield, John clambered back aboard G-AHOF for the return flight to Croydon, the trimotor departing Nutts Corner at 1343hr, the crew once again allowing him to pilot the aircraft, this time for 50min. The Jupiter's wheels touched down at Croydon at 1604hr after 2hr 21min airborne.

THE END OF THE LINE

Although the Jupiters, with their light controls and sedate landing speeds, were generally liked by their BEA pilots, keeping them airworthy proved something of a challenge, the exhaust-collector rings being in particularly short supply, as were new tyres and engine spares. Such spares as could be found were generally of extremely poor quality, having been manufactured on Germany's much-disrupted wartime production lines. In addition, the Jupiters' BMW 132Z engines could only be started with a ground power unit, which was fine for services from major airports such as Glasgow, Croydon and Belfast, but the more

"THE JUNKERS' USE BY BEA HAD BEEN SHORT, BUT THE CORPORATION'S AIR- AND GROUNDCREWS HAD WORKED HARD TO GET THE BEST OUT OF THEM, THUS PROVIDING AN INVALUABLE INTERIM SERVICE . . ."



ABOVE Jupiters G-AHOF and G-AHOE are prepared for their next flights on the damp hardstanding beside the terminal at Nutts Corner. Field Air Services at Croydon managed to keep the trimotors' BMW 132Z engines in good working order, but spares began to dry up quickly and the Ju 52/3ms were withdrawn in the summer of 1947.

remote Scottish airfields served by the trimotors were not so equipped, and the engines had to be kept running while on the ground. If the weather clamped down and the engines had to be shut down, a ground power unit and engineer would then have to be flown in from Glasgow to start them again — an expensive and inconvenient extravagance for the nascent airline.

Forced to accept that the Ju 52/3ms were only ever going to be a stopgap, BEA announced that the type would be withdrawn from service on August 31, 1947, the last Jupiter London—Belfast—London service being completed on May 18. By the end of August, only three of the Ju 52/3ms were still airworthy, with the others cannibalised for spares. After a mere five months of BEA service, the Jupiters were retired and ferried to Manchester-Ringway to be put into

storage pending their disposal. In February 1948 all the BEA Jupiter airframes were sold to the British Aluminium Co Ltd and scrapped at its Warrington works.

The Jupiters were replaced by Dakotas on the London—Belfast route and by May 1947 the Vikings had started coming back into service following their modification programme. The Ju 52/3m's use by BEA had been short, but the Corporation's air- and groundcrews had worked hard to get the best out of them, thus providing an invaluable interim service while the fledgling BEA feathered its wings. Fortunately for us, John Stroud was on hand to record the young corporation's short-lived attempt to exploit the rugged dependability of a type that, just a few years earlier, had been a sinister symbol of the nation's deadliest enemy. **NS**



The only Ju 52/3m of BEA's fleet of ten to suffer a serious accident was G-AHOK, WNr 2998 (formerly VN742), which was damaged beyond repair in a landing accident at Glasgow-Renfrew on January 26, 1947. Written off, it was photographed by John during one of the many visits he made to Scotland at the time.





ARMCHAIR AVIATION

We take a look at what's available for the aviation history enthusiast in the world of books and other literature, from hot-off-the-press publications to reissued classics

The Happy Warrior: James Thomas Byford McCudden VC

By Alex Revell; Aeronaut Books, PO Box 610253, San Jose, CA 95161; 8½in x 11in (216mm x 279mm) softback; 304 pages, illustrated; £19.25. ISBN 978-1-935881-34-6

JAMES McCUDDEN VC DSO MC MM came from a working class Army family and joined the Royal Flying Corps in 1913 as a mechanic aged 18. He became an observer and then a pilot while still a non-commissioned officer, and was finally promoted Major with an official score of 57 aerial victories before his death aged 23. He wrote his autobiography, *Five Years in the Royal Flying Corps* (called *Flying Fury* in some editions), itself a classic, in the spring of 1918.

Alex Revell's book *The Happy Warrior* (named after Tryggve Gran's description of McCudden) is surely the definitive work on the subject. Revell was planning this book in 1967 when Christopher Cole published his biography, *McCudden VC*, and so shelved the idea. His lifelong project now sees the light of day.

Revell believes that McCudden was among the greatest of all fighter pilots. This depends not only on victory scores, but also on the quality and availability of the opposition; the verifiability of the score claims (McCudden's was better than most other Allied First World War aces, and a lot higher than some that could be mentioned); leadership skills; influence in developing tactics and technology, and the regard in which others held him. McCudden realised that destroying enemy fighters was less important than destroying the two-seaters that were observing the ground forces. A well-flown two-seater needed treating with respect, but McCudden brought down 45 of them between September 1917 and March 1918, twice getting four in one day. He personally tuned his engine to be able to fly some 3,000ft (900m) higher than most other S.E.5as; he had excellent eyesight and an above-average tolerance of low oxygen levels

and extreme cold. A professional soldier to the core, if he had lived he would surely have risen to a high rank.

The main section of the book feels somewhat like a repetition of *Five Years* . . . , and some passages are close to being repeats of the author's other works on No 56 Sqn; but, as he has attempted to write the definitive work, he was bound to use all information available. The appendices and the copious endnotes are the results of decades of research. Revell gives a new perspective on McCudden's fatal crash: the belief that it was the result of a highly experienced pilot making an elementary mistake is at best an oversimplification, and almost certainly there was a cover-up of the true cause.

The book is a paperback using fairly coarse paper that is not ideal for reproduction of the photographs, but this is probably about keeping down the costs. There are a fair number of typographical errors: I hesitate to say this as Revell credits his wife with the proofreading, but most examples are not in the main text but in the endnotes and photo captions, and are mostly technicalities which a non-specialist may not pick up. But this remains an essential book for anyone with an interest in Great War aviation.

ADRIAN ROBERTS

The Other Space Race – Eisenhower and the Quest for Aerospace Security

By Nicholas Michael Sambaluk; Naval Institute Press, 291 Wood Road, Annapolis, MD 21412; 6in x 9in (157mm x 233mm); hardback; 320 pages, illustrated; £30. ISBN 978-1-612518-86-2

FOR SEVERAL DECADES it has been a commonly held view that President Dwight D. Eisenhower preferred playing golf to addressing national defence issues and that he led his country sleepwalking into a vacuous disregard

The Happy Warrior

James Thomas Byford McCudden VC

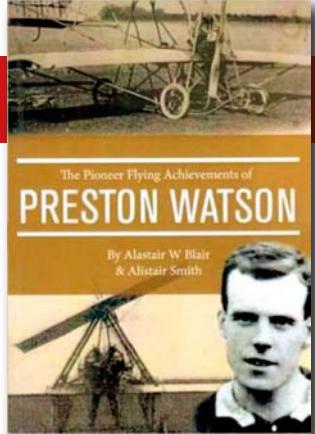
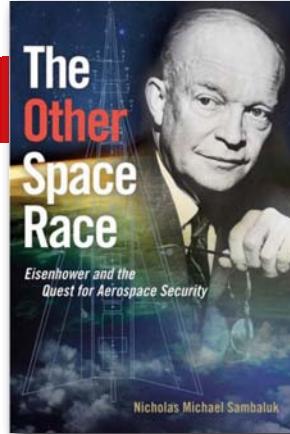


Alex Revell

The Other Space Race

Eisenhower and the Quest for Aerospace Security

Nicholas Michael Sambaluk



for threats from a belligerent Soviet Union. Under his watch, rumours of a "bomber gap", and then a "missile gap", flourished and gained traction with an electorate still traumatised by the Japanese attack on Pearl Harbor a decade earlier. It brought widespread shock over the launch of the Soviet Union's Sputnik 1 and caused military chiefs to warn persistently of the USA's potential vulnerability to attack.

The Eisenhower administration lasted eight years, from January 1953 to January 1961. A Republican, Ike had been persuaded to stand for office over concerns that the incumbent, Democrat Harry Truman, had increased the national debt, been profligate with military spending on the whims of paranoid service chiefs and had squandered the nation's financial resources through excessive spending.

A counter-view has gained traction in recent years, however, with the publication of several books in which it is argued that Eisenhower quietly set about preparing the nation to resist the belligerent Soviet bear and, in reality, did more than his predecessor to raise America's defence preparedness. Nicholas Sambaluk's book is one of the latest and most cogently argued interpretations of that issue to date, presenting the facts in a highly readable style while retaining a dispassionate stance and providing copious references.

Support for his view comes from evidence only now coming to light, paired with an increasing amount of declassified material. Conservative in his use of fiscal and material resources, Ike actually initiated a wide range of military and intelligence-gathering assets which prepared the USA for superiority in its deterrent structure, missile programmes and space-based capabilities in the decade after he left office.

Eisenhower was directly responsible for starting the Atlas, Titan and Minuteman intercontinental ballistic missile programmes as well as the Polaris submarine-launched ballistic missile; for expanding the deployment of air-

deliverable tactical nuclear weapons, and for establishing the first generation of spy satellites crucial to debunking the missile-gap myth. He also restrained Pentagon chiefs in their efforts to overbuild the nuclear deterrent when intelligence officials knew, but could not publicly disclose, that Soviet Russia had boasted of war-fighting assets far in excess of its capabilities.

When running for President and slamming the Eisenhower administration for apathy, John F. Kennedy used national fear over perceived Russian military supremacy to suppress classified briefings he received revealing the fallacy that Russia was leaping ahead. When he became President he used this knowledge to retract a pre-election promise to the military for massive spending on the nuclear deterrent, cancelling many aerospace and missile projects and slashing others, gaining many enemies in the process. Insiders knew the truth and this reviewer recalls from personal experience whispers within the Washington DC corridors that Kennedy was "living on borrowed time".

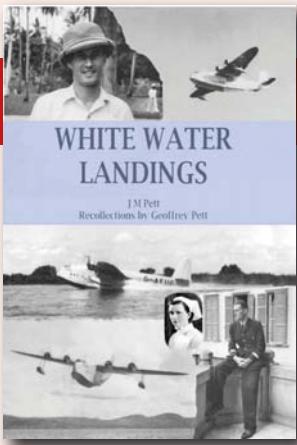
Vindication of the Eisenhower administration is long overdue and this book brings an academic dignity to the debate, with much evidence to show prudent balance between excess and insufficiency during those tense years.

Dr DAVID BAKER

The Pioneer Flying Achievements of Preston Watson

By Alastair Blair and Alistair Smith; Librario Publishing, Brough House, Milton Brodie, Kinloss, Moray IV36 2UA (www.librario.com); 5¾in x 8¼in (146mm x 210mm); softback; 178 pages, illustrated; £11.99. ISBN 978-1-909238-48-0

JUST WHEN WE thought the claims regarding alleged powered flights by Preston Watson of Dundee in 1903 had been laid to rest, this



small volume regurgitates all the old worn-out arguments. Unfortunately it is so full of errors regarding the work of Watson and other pioneers that it is grossly misleading. As far as Watson is concerned the authors give prominence to the facts, opinions and reports which favour their hero, much of which is extremely unreliable and invalid belated testimony. It is very wrong to "invite readers to arrive at their own conclusions" after presenting an extremely biased and misleading case. Where is the evidence that "Watson and the Wrights may have been in touch with each other" (p136)? The Wrights meticulously kept all their correspondence, but the authors have found none. There is only a very vague secondhand rumour from the late 1940s that Orville spoke of Watson (p29). It is certainly wrong to state as fact that: "It is known, for instance that at some point he was in correspondence with the Wright brothers". Yet on page 103 they again assert the link, stating: "Watson was known to the Wright brothers, suggesting he had been in correspondence with them, but at what date and on what subject is not known" — an outrageous leap of assumption.

The authors are clearly out of touch with current understanding of other pioneers' achievements. The accounts of the work of "Cody" (actually Cowdery, not "Chowdery", as the authors have it), Roe and Mozhaisky are sadly awry. Nor are they very well informed as regards precedents. The first control column to operate rudder and elevators in the manner now accepted was incorporated by Pénaud in his prophetic 1876 design for a full-size aeroplane. That was the first "joystick". They also go to some lengths on the origins of laminated propellers, but seem unaware that those of the 1903 Wright Flyer were laminated.

The postscript overflows with unjustified assumptions and unfounded claims. For example, Watson's rocking wing was totally

different from the fixed parasol wing, apart from the fact that both employed pendulum stability. Watson might have been the first to conceive the rocking-wing system, but there is no evidence that anyone else was inspired or influenced by him to take it up. Similar systems were subsequently adopted by Spratt in the USA with his "control-wing", and much later still by the hang-glider fraternity, but there is nothing to suggest that Watson's work inspired either of these developments. Nonetheless, it is said that Watson's rocking-wing system "must have enlightened and informed the field of aviation", but where is the evidence? There is none. To say that wing-warping "certainly waned after Watson's invention" is simply silly. There is nothing to show that Watson's system had any influence on the way things developed. This is not "a matter of opinion", it is a matter of fact.

The authors' assertion that Watson made "lasting contributions" and deserves "a more prominent place" in aviation's early history is nonsense. He was just one of a great many who pursued their own notions with little or no effect on anyone else. That is why his name does not appear in the authoritative histories, something that seems to baffle the authors.

PHILIP JARRETT

White Water Landings

By J.M. Pett with Geoffrey Pett; Princeling Publications (available from www.ppbooks.co.uk); 6in x 9in (152mm x 229mm) hardback; 282 pages, illustrated; £30. ISBN 978-1-320766-91-3

ENJOYABLE REMINISCENCES written by leading individuals involved with Imperial Airways during the 1930s are joined by this late arrival; a compilation of memories from a pioneering yet modest Station Superintendent. Geoffrey Pett was a trainee with the airline

“BRISTOL” BLENHEIM THE BLENHEIM SOCIETY

The Journal of the Blenheim Society. Edited by James P. Dale, e-mail james.dale@tesco.net; 11½in x 8½in (297mm x 210mm); 16 pages, illustrated; published three times a year and available to Blenheim Society members as a benefit of their annual subscription (£15 for normal membership). Website www.blenheimsociety.org.uk



LAUNCHED IN 1987 to cater for former aircrew, groundcrew and anyone with an interest in the Blenheim, as well to as record the type's history, the Blenheim Society has also supported the restoration and operation of the sole airworthy example, put back in the air thanks to the determination of the late Graham Warner. The journal is the membership's main channel of communication.

July 2016's issue (No 85), which arrived shortly before TAH17 went to press, contains a typical mixture of material, beginning with messages from the editor and the society's chairman, plus items of news, lists of new members and obituaries of recently-deceased members. Feature articles comprise rare first-hand recollections by an air gunner who joined the RAF before the onset of World War Two; and an account of a 114 Sqn pilot's career on Blenheims. The journal wraps up with an identification challenge concerning a piece of memorabilia, plus letters, book reviews and photographs, all reflecting a lively and thriving organisation. MO

during 1933–36, and at the age of 21 was despatched to take on roles associated with the UK—South Africa route.

He started at the Brindisi flying-boat base in Italy, and then learned a great deal during his first major African posting at Mbeya in Tanganyika. Within 12 months he was the airline's employee at Lindi, on Tanganyika's Indian Ocean Coast. A survey had settled on an area fit to accommodate the Short S.23, and it was his job to turn the plan into a base. It is an illuminating story of how a 22-year-old collated knowledge and developed skills, maturing in a culture where Europeans were a privileged few among a sparse native community. He mixes tales splendidly, telling of how inhabitants found flying-boats unfathomable, and his own amazement as he and the radio officer addressed the issue of guiding arriving aircraft during inclement weather. His description of being sat in a launch as an Empire 'boat roared out of low cloud, then chasing its wake to lead it to the moorings, is a vivid reminder of what these operations entailed. Within 12 months he was on the Nile at Juba in Sudan, repeating the base-creation exercise a few miles south at Rejaf. Again it was a community-centred enterprise. He could not access the river as it was lined by impenetrable scrub, but the natives knew the answer: "Follow the 'hippo run'!".

In 1939 Pett returned to Britain, where he met his future wife, before returning to Cairo. They married while she was nursing in Uganda in 1942, but had to navigate a barrage of red tape to do so, as his wedding was not deemed a priority in those busy days of the wartime Horseshoe Route.

This book, put together by Pett's daughter, is based on a series of tape-recordings made up to his death in 2005. Careful editing has preserved the intonations and period expressions that take the reader back to those times, and has also retained much of the intimacy of his recollections. Anyone interested in this period

of aviation will find these little-heard tales of pioneering operations against a backdrop of very different societies and locations invaluable, and there are more than 70 previously unpublished photographs. The book's informality provides an excellent source of aviation and social history.

MIKE HIRST

First Out in Earnest: The Remarkable Life of Jo Lancaster DFC

By David Gunby; Fighting High Ltd (available from www.casematepublishers.co.uk); 6in x 9in (152mm x 229mm) hardback; 320 pages, illustrated; £25. ISBN 978-0-993212-97-0

WHILE MANY of Britain's most distinguished test pilots have enjoyed a degree of fame within the mainstream — indeed the late Eric "Winkle" Brown became a household name in his last few years — one who has eluded greater public acclaim is John Oliver "Jo" Lancaster, whose achievements were every bit as significant as those of his contemporaries. It was Jo who first used an ejection seat "in anger", when the Armstrong Whitworth AW.52 he was testing in May 1949 became uncontrollable. When the jet flying-wing started dismantling itself in flight, Jo took the decision to use the new-fangled seat and "punch out" into the history books.

Typical of Fighting High's commitment to quality, this attractive, well-produced biography details Lancaster's long and varied life in aviation, from his early days as an Armstrong Whitworth apprentice, through his wartime experiences as an RAF Bomber Command and A&AEE pilot (during which, like Winkle, he tested German types) to his post-war exploits as a test pilot and, later, his overseas crop-spraying and aerial survey work. Recommended.

NICK STROUD

BOOKS IN BRIEF

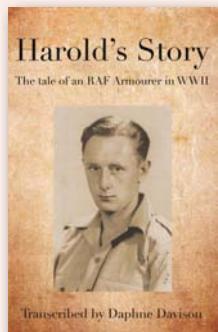
A quick round-up of what else is currently available for the aviation history enthusiast

HAROLD'S STORY

*Transcribed by
Daphne Davison*

The Book Guild; ISBN 978-1-910508-99-2; £12.99

THIS BOOK GUILD-published memoir, based on audio interviews transcribed by his cousin Daphne Davison, details the wartime career of RAF armourer Harold Marsh, a Kentish lad who joined up in June 1939. Offering a different perspective from the usual aircrew recollections, this 5½in x 9in hardback follows Marsh's training in the UK and posting to the Far East (with an interesting account of the fall of Singapore), including sojourns in Sumatra, Ceylon and India. Not an aviation-themed book per se, it does provide a fascinating snapshot of the groundcrew's view. NS



RARE BIRDS: FORGOTTEN AIRCRAFT OF THE SECOND WORLD WAR

Charles R.G. Bain

Fonthill Media Ltd; ISBN 978-1-781555-24-8; £25

FOR EVERY Supermarine Spitfire, Junkers Ju 88 and Mitsubishi Zero in the pantheon of legendary World War Two aircraft, there is a host of also-rans and obscure oddbirds. This collection of potted histories of 40 of these "forgotten" types (Lysander and Gladiator; forgotten?) offers a brisk gallop through each type's design, role and service career, accompanied by photographs and leading particulars. Each entrant gets an average of three pages, which really isn't enough to offer any meaningful insights. The Vought OS2U Kingfisher is included, but the far rarer and almost completely forgotten Curtiss SO3C Seamew is not. Odd. NS

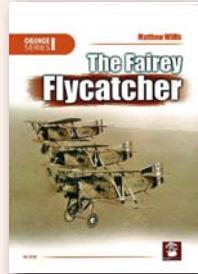


THE FAIREY FLYCATCHER

Matthew Willis

Mushroom Model Publications; ISBN 978-8-363678-92-0; RRP £15

LIKE ITS LATER stablemate the Gannet, the Flycatcher had a hideous beauty (or beautiful ugliness?) that lent the type a strange charisma. The Royal Navy's archetypal fighter of the inter-war period, the inelegant biplane was never called on to serve in combat, but it did tackle pirates off the Chinese coast. Renowned naval aviation historian (and TAH author) Matt Willis does his usual excellent job of telling the type's full story for this definitive history. NS

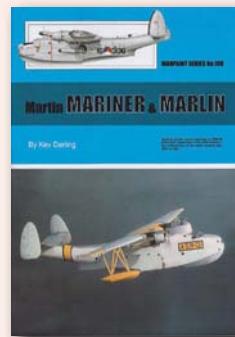


MARTIN MARINER & MARLIN

Kev Darling

Guideline Publications; no ISBN; £15.50

VOLUME NUMBER 108 in the invaluable *Warpaint* series of monographs initiated by the late Alan W. Hall of *Aviation News* many decades ago, this 48-page softback describes the US Navy's PBM patrol bomber flying-boat and its successor, the P5M. The book follows the pattern of its predecessors, comprising a history illustrated with well-reproduced photographs, plus scale drawings, colour profiles, data tables and a set of detail photographs. All-in-all it is a concise and informative reference source, aimed primarily at the scale modeller. MO

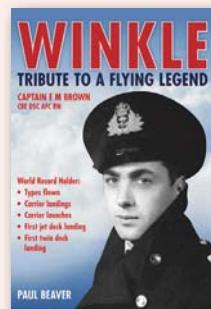


WINKLE: Tribute to a Flying Legend

Paul Beaver

Beaver Westminster Ltd; ISBN 978-0-995554-52-0; £10 & £4 p&p

MUCH HAS BEEN written about the life of legendary naval aviator Capt Eric M. "Winkle" Brown, but this 56-page pocket-sized (5½in x 8½in) softback is the first to take a look at the great man's flying career through the unparalleled number of aircraft he flew. The author, a longstanding friend of Brown's, has trawled the latter's logbooks to list every type flown by this most distinguished of airmen, with accompanying artworks of some of them provided by artist Jon Freeman. Extended notes cover some of the more significant or interesting types, and there is a useful chronology of Winkle's duty assignments. NS

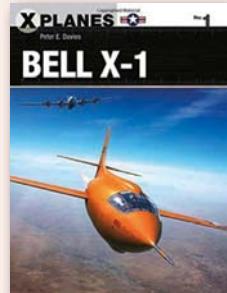


X PLANES: BELL X-1

Peter E. Davies

Osprey Publishing Ltd; ISBN 978-1-472814-64-7; £12.99

THE FIRST IN Osprey's new *X Planes* strand, this 80-page softback details the history of Bell's famous X-1 series of experimental rocket aircraft. With a clean, uncluttered layout broadly similar to that used in Osprey's other highly successful aviation titles, this well-thought-out and handsome tome includes plenty of additional info in the form of useful boxes, high-quality illustrations and excellent photographs on good paper. If this first volume is anything to go by, we look forward to the rest of the series. NS



Lost & Found

PHILIP JARRETT explores the lesser-known corners of aviation history, discovering unknown images and rediscovering long-lost details of aircraft, people and events. This time he needs your help to find out more about a pair of well-travelled de Havilland Moths

IT WOULD BE nice to have a bit more information about the events depicted in these two photographs, both concerning de Havilland aircraft in the 1930s. The first, showing D.H.83 Fox Moth G-ACDD after what appears to have been a landing accident, was apparently taken in Belgium, from where the postcard originated. This Fox Moth went to Belgium in July 1935 as OO-ENC, so it seems that this mishap must have occurred either on its delivery flight or shortly thereafter. Its stay in Belgium was short, as it went to New Zealand in January 1936 and became ZK-AEK, and then moved on to Fiji to become VQ-FAT.

Our other subject, de Havilland D.H.80A Puss Moth G-AAZX, was awarded its Certificate of Airworthiness in July 1930 and registered on November 1 that year. In two registers of British civilian aircraft published in 1931 its owner is listed as Vickers (Aviation) Ltd at Brooklands Aerodrome, Surrey. In this snapshot, taken at Novi Sad Airport, Serbia, it carries the legend "Standard Radio" on its rudder, indicating that the picture was taken between August 1934 and February 1937, when it was owned and operated by Standard Telephones and based at Hatfield. It forms the backdrop for a group of military officers with a couple of civilians (the aircraft's crew?).



This Puss Moth survived to be impressed into the RAF as X9401 in May 1940, its registration having been cancelled on April 4 that year, when its owner was C.S.J. Collier, "c/o Surrey Flying Services Ltd". It was delivered to No 5 School of Technical Training (S of TT) at Locking on April 5 and transferred to No 12 S of TT at Melksham on November 11, 1940, where it spent the remainder of its days as an instructional airframe with the Maintenance Command identity 2304M.

Can any readers provide further details on the Fox Moth's mishap or the Puss Moth's flight to Serbia?



TOP Crunch! Fox Moth G-ACDD with a smashed undercarriage after a landing accident, apparently in Belgium. Can any readers fill in the gaps on what happened, when and where?

LEFT What seems to be a group of military officers and a pair of civilians pose beside de Havilland Puss Moth G-AAZX at Novi Sad Airport in northern Serbia some time during the mid-1930s. If you have more information, contact the Editor!

BIGGIN OR BUST!

In July 1957, having recently gained his private pilot's licence via an RAF flying scholarship, **DAVID GREEN** took off from Croydon on one of his regular (completely unsanctioned) Tiger Moth jaunts down to Brighton, during which he would fly over the beach waving to the girls below. On this trip, however, an unexpected weather front and a wrong turn on the way home led to an unscheduled arrival at a fully operational RAF station



IN 1956, HAVING completed glider training with my local Air Training Corps unit, I was awarded a flying scholarship, in which the RAF would pay a civilian flying club to teach air cadets to fly and gain their private pilot's licences (PPLs) within 35hr. I was to be taught on the trusty de Havilland D.H.82a Tiger Moth at Croydon Airport, a grass airfield and former Battle of Britain fighter station, and in the late 1950s still a major international airport.

As readers will know, the Tiger Moth is an open-cockpit biplane with a sprung metal skid in place of a tailwheel; no brakes, no nav lights, no radio — in fact, no electrics at all apart from the twin-magneto toggle switches located on the outside of the fuselage. The fuel gauge is a manometer tube protruding from the top of the fuel tank in the upper-wing centre section, and only gives an accurate reading with the aircraft in level flight. Pre-flight checks therefore include lifting the tail to get a correct fuel reading. Communication between the front and rear cockpits was at that time achieved by means of the ancient but effective Gosport tube system.

When on a training flight, overflying the "signals square" at the destination airfield gave arriving NORDO (no radio) pilots critical information about the field, including the condition of the grass etc. The parachute we were provided with — which had not been repacked for years — was not to be used under any circumstances, and served merely as a much-needed cushion in the bucket seat.

CHIMNEY? WHAT CHIMNEY?

And so we cadets began our training. While on finals at the end of my first flight, on August 15, 1956, the instructor, Mr Ward, casually said "watch out for the chimney". "Which particular chimney might that be, sir?" I replied. "That one!" he roared as he banked steeply to port to bring a 100ft (30m)-high brick chimney sharply into view and practically within arm's reach.

A little later into my training, during a tour of the Surrey environs, my instructor dropped to 250ft (75m) for a closer look at an open-air fête below. "Are we supposed to do this, sir?" I asked. "Certainly not!" he replied. "You do as I say, not as I do!"



AUTHOR'S COLLECTION

We cadets vied to solo first in the smallest number of dual hours. One chap did it in 5½hr and the competition heated up. Convinced that I was ready to go solo, I begged my instructor to let me have a crack at it. "What's the hurry?" he replied. "You've only done about five hours or so". I quickly put him straight: "I'm up to eight hours dual now, sir". "Oh really?" he replied. "OK then, we'll do a circuit or two and I'll see".

I finally made my first solo flight after 8¾hr dual. Flying only on weekends, the unpredictable English weather and wind limitations resulted in my completing the course in 13 months. Travelling regularly from Clapham to Croydon on the train, I became adept at forecasting the strength of the wind according to how much the trees were bending.

My instructor began sending me off to nearby Redhill aerodrome to practise forced landings. It was not much more than a field with a wooden shack and a windsock back then, and with my woefully lacking map-reading skills I never managed to find it. So, being a resourceful chap and not wanting to waste a flight, I decided to

OPPOSITE PAGE Built by Morris Motors at Cowley in 1943, Tiger Moth G-ANDE (c/n 85957) was originally given the RAF serial EM726 and was sold on to the UK civil register in September 1953. ABOVE The author proudly poses for a photograph in his Air Training Corps uniform outside the family home in Clapham in the mid-1950s.

Tiger Moth G-ANDE at Croydon in December 1953, shortly after its arrival. The aircraft was silver/grey and the zig-zag stripe and cheat-line may have been dark blue. Note the twin chimneys of Waddon Marsh power station in the background, narrowly avoided by the author — these are now landmarks for the Croydon Ikea store.



follow the London—Brighton railway line down to the Channel coast and began stooging up and down Brighton beach, waving to the girls below at about 500ft (150m) — or less.

After one of these jaunts my instructor casually mentioned: "Green, we've had several reports of low-flying aircraft over Brighton beach. You wouldn't know anything about that, would you?". I responded quickly; "Who, me sir? Oh no sir." With a hard, penetrating stare, he said, "Good. Because the penalty for that sort of thing is quite severe". Undeterred by this oblique warning, this intrepid aviator continued his Brighton beach forays.

A THIN DARK LINE

And so it was that at 1430hr on July 1, 1957, I set off from Croydon for Brighton in Tiger Moth G-ANDE. Glancing inland from the coast after a couple of turns along the beach, I registered a thin dark line above the distant horizon. A turn later and the dark line seemed to be thicker, closing in and dropping. Time to head off home.

As I followed the trusty train tracks northwards the cloudbase continued to drop until I was down to 1,000ft (300m) above ground level (AGL) with about a mile or two at best visibility. I reduced my airspeed in order to keep "ahead of the aircraft", as they say in today's parlance.

I was not unduly concerned because the correct left fork in the tracks would lead me straight to Croydon. However, after the usual time had elapsed and Croydon had not yet materialised, I realised that I must have missed the fork. When RAF Kenley hove into view I relaxed a mite, since I knew that Croydon was

roughly north-west, and I began to fly arcs in the north-west quadrant in an attempt to spot Croydon while not losing sight of Kenley. Croydon, however, did not appear and I lost sight of Kenley. Alarmed, I turned back towards where Kenley should have been but shortly found myself above Biggin Hill, the legendary RAF fighter station in Kent, then still operational with Gloster Meteor jets. I knew that it was strictly forbidden for civil aircraft to intrude into such airspace but, with visions of wrecking my undercart in some farmer's field — if I was lucky enough to avoid telephone cables etc — I decided that it was "Biggin or bust" and began flying a circuit around the airfield at 1,000ft AGL.

Immediately, the control tower aimed a red Aldis lamp at me, which I ignored, as I did the series of red flares which followed. Biggin Hill was my salvation and I wasn't going anywhere. The calm at the cessation of the pyrotechnics was shattered when I saw a Meteor heading straight for me. Unnerved, I looked doggedly straight ahead. The twin-jet fighter flashed beneath me, leaving me wondering about such incidentals as separation, with me at 1,000ft AGL — or less.

A minute or so later I was relieved to see a green Aldis light from the tower, and I started to let down for a landing. With no signals-square in evidence I couldn't judge the state of the grass, so the 5,000ft (1,500m)-long concrete runway it would have to be, no brakes and a sprung-metal tailskid notwithstanding. A windsock was also nowhere to be seen, so I took pot luck and chose my approach. During the flare the concrete was whizzing past at practically cruising speed — I was going downwind! With ample runway to

spare, I opened up, executed a "180" and landed.

The Tiger Moth rolled and rolled down the runway until eventually an exit appeared, which I managed to negotiate. I came to rest and sat there. Peering around the grass horizon I couldn't discern anything, and decided my best bet was to stay put until someone came out to rescue or arrest me.

FRYING PAN TO FIRE?

A Land Rover eventually drew up alongside, from which a youngish moustachioed RAF officer emerged. Lifting the ear flap of my leather helmet I heard him say, "Hello. Lost?"

I explained the situation and added that if he could point me in the general direction of Croydon I would get out of the station's hair. "Well, I'd better check with the tower, old boy", he replied, "so wait here a bit and I'll be back". This was not what I wanted to hear.

The officer returned and told me that the tower couldn't let me go in this dreadful weather, and that a jeep would come over shortly and I should follow it to a tie-down. It looked like I was stuck here for the night — or longer. Now I'm for it, I thought. How on earth was I going to explain this to my instructor?

A jeep eventually materialised and the exuberant groundcrew in it signalled for me to follow them. Right-ho. The jeep promptly took off across the grass at about 45 m.p.h. (70km/h). The Tiger Moth gets airborne at not much faster than that, so any question of zig-zagging to clear the nose of my taildragger as per normal taxiing was completely out of the question. To keep the jeep in sight I was obliged to lift the tail, so that my machine was almost airborne as we raced and bounced across the airfield.

With the aircraft duly tied down, I was directed to a wooden hut that turned out to be the pilots' dispersal hut. An officer in flying kit approached, explained that he was the pilot

of the Meteor and apologised if he gave me a scare, but they were plagued with civil aircraft snooping around, and he was ordered to get my registration. Surely, I thought, the tower didn't really think that I had come intentionally to snoop around and then fly off in this murk?

On the direct telephone line to Croydon, my instructor answered: "Green? Where the devil are you? Biggin Hill? What on earth are you doing there? You landed? Good Lord, I wouldn't know where to begin!" What would have been a 5-8min flight to Croydon took me almost 2hr to complete via a succession of country bus routes. I must have made a curious sight standing in the queue clad in my Sidcot suit, fur-lined RAF standard-issue flying boots and clutching my leather helmet, goggles and gauntlets.

The bus journey gave me ample time to ponder my looming fate. Will the flying club scrub me? And what will Biggin Hill air traffic control do after witnessing this impudent little biplane illegally intruding into its sacred airspace and refusing to leave, before performing mild aerobatics at almost zero feet in the middle of their 5,000ft runway and — the *pièce de résistance* — following this up with a "Keystone Kops"-style wild race between the Moth and one of its own jeeps across its airfield?

There was no "court of enquiry", in fact no admonitions at all. Was the flying club simply relieved to get its Tiger Moth back in one piece? Perhaps, I thought, a trifle smugly, that the club was secretly in awe at this novice managing to land the Moth at Biggin without mishap. But then again, when the weather cleared, I was not to fly the Tiger Moth back — that was to be the job of the chief flying instructor. Ouch — salt in the wound.

So, what did I learn about flying from this, apart from that my map-reading and airmanship were woefully lacking? To do as one's instructor says, not as he does!



A happier return — G-ANDE at Biggin Hill in September 1964. In 1958 Biggin Hill ceased to be an operational RAF station; and, with the closure of Croydon in 1959, much of the civil and light aviation activity at the latter relocated to Biggin. Tiger Moth G-ANDE survives today and is being repaired and rebuilt after a non-fatal accident in 2007.

MIKE STROUD / TAH ARCHIVE





PHOTOGRAPHS BY THE AUTHOR

OFF THE BEATEN TRACK

Ever turned a corner to find something unexpected? The Aviation Historian's intrepid aeronautical explorer PETER DAVISON investigates the stories behind the oddities that turn up in the most unusual places

THESE DAYS modern airliners tend to enjoy extremely long service lives, often finding second lives as freighters before being put into deep storage in remote desert boneyards. No such destiny for our subject in this issue — Airbus A300 TC-FLJ.

Making its maiden flight from the Airbus factory at Toulouse on August 18, 1980, A300B4 c/n 82 was delivered to Japanese short-haul operator TOA Domestic as JA8464 in October the same year, moving on to serve with Japan Air System from April 1988. The long-serving Airbus returned to Europe in 2004 to operate with Turkish charter airline Fly Air, which in turn occasionally leased the airliner to Saudia. Retired and stored at Istanbul in 2006, the Airbus was moved to Konya in the Central Anatolia Region of Turkey and became part of a public space dedicated to aviation in March 2014.

Konya is also home to the air force's Turkish Stars formation aerobatic team, famous for its excitable accompanying commentaries as much as its precision displays. In 2001 the team performed for a million spectators in Baku, Azerbaijan. The first Turkish display team was formed in 1952 with Republic F-84G Thunderjets, but the current iteration was established in 1993 with four refurbished former Royal Netherlands

ABOVE All aboard! Airbus A300B4 TC-FLJ at the aviation park a short distance from Konya Airport. Note the dummy engines. BELOW One of the Turkish Stars NF-5As mounted in a pond. The park's Google Earth co-ordinates are N37.957243, E32.559563.



Air Force Canadair NF-5As, the team expanding to its present eight-aircraft formation in 2004. Today at the Konya aviation park, two retired NF-5As in Turkish Stars colours flank the A300, the latter being used as a restaurant and the former as ornaments in decorative ponds.





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